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DECEMBER

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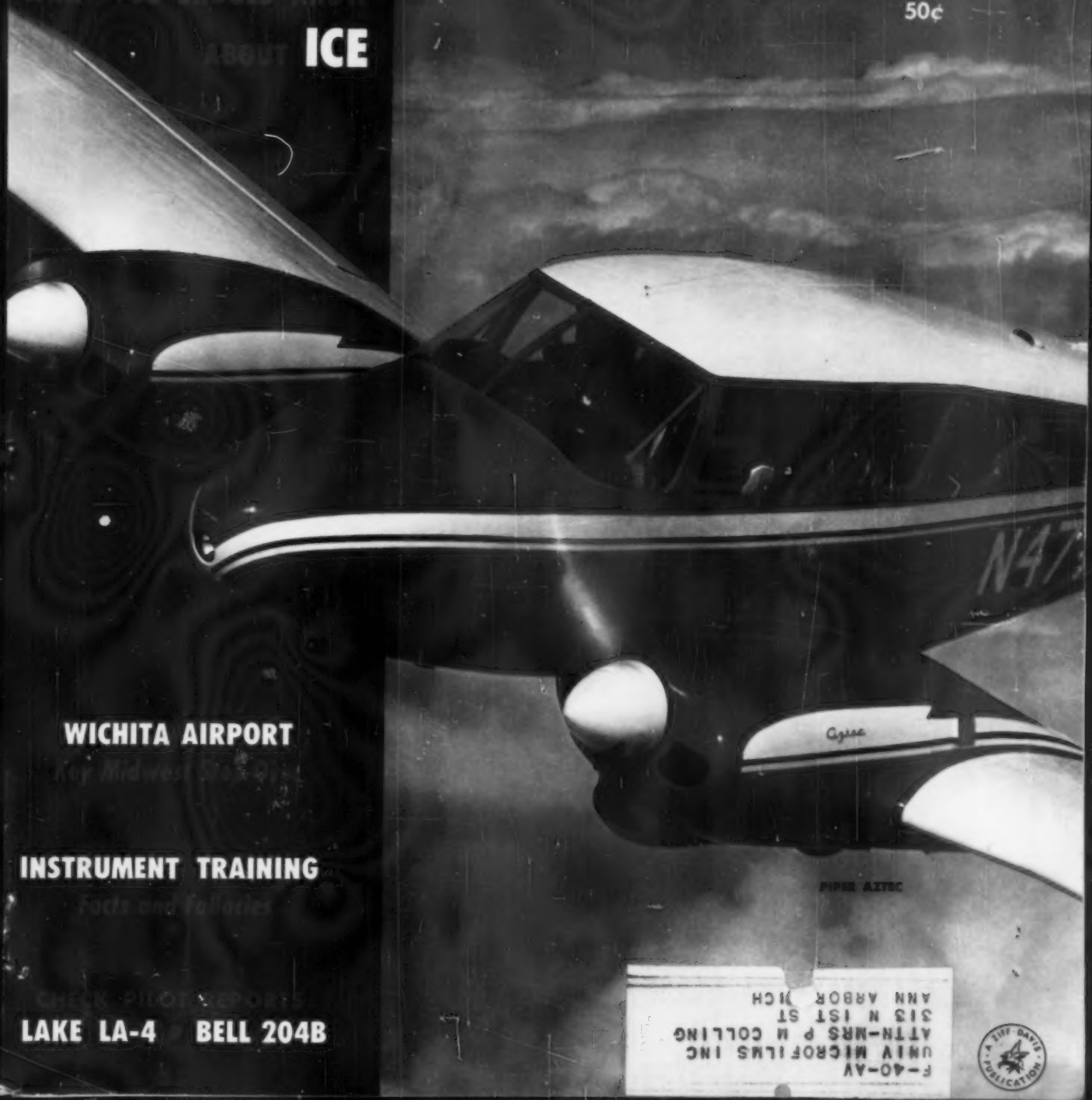

WICHITA AIRPORT

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Fads and Fallacies

CHECK PILOT REPORTS

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A ZIFF-DAVIS PUBLICATION

FIRST IN THE JET AGE!
With Jet Age Joe, Esq.
With all the big things going on in its shops and warehouses, Southwest Airmotive still accents the little things that make a man feel important—like an office and a stenographer when he needs 'em in a hurry between flights.
Lolette Cotten and the Jet Age are growing up at the same time. Frankly, I developed somewhat earlier, in the Age of Gas-Filled Balloons.
It's appropriate, though, that the three of us—Miss Cotten, the Jet Age, and I—got together at Southwest Airmotive. The dreams of youth and the reality of experience have blended here since long before she was born!

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DECEMBER, 1960

VOLUME 67, NUMBER 6

COVER: Piper's new five-place Aztec is powered by two 250-hp Lycoming 0-540 engines. Range, at 75 per cent power, is 1,025 mi.; at 45 per cent, 1,400 mi. The 205-mph aircraft also flies with the Navy; designation is UO-1. (Photo by Anthony Linck)

CONTENTS

EDITORIAL 30 *Gill Robb Wilson*

Only if man fulfills his destiny can he become migratory in the universe

NEW AIDS FOR GENERAL AVIATION 32 *Myron B. Gubitz*

Visual approach guide is typical of the systems evaluated by FAA's NAFEC

MORE PORTS FOR BUSINESS FLYING 35 *Kendall K. Hoyt*

Airports face stiff competition for land from new community developments

WICHITA AIRPORT 36 *Lou Davis*

An air-minded city bids for top ranking in airport utility and comfort

CHECK PILOT REPORT: BELL 204B 38 *A. C. Bass*

Bell modifies its record-setting military helicopter for commercial use

AIRMAN'S WORLD 40 *Gill Robb Wilson*

The pilot who looks down in speculation will perceive an essential truth

CHECK PILOT REPORT: LAKE LA-4 42 *Gerald J. Schlaeger*

Only American single-engine production amphibian, now fitted with skis

INTEGRATED INSTRUMENT TRAINING PROGRAM 44 *G. Courtney Chapman*

Facts and fallacies clarified by recent three-university test evaluation

WHAT YOU SHOULD KNOW ABOUT ICE 46 *Jack LeBarron*

There comes a time when any pilot needs answers. An informative analysis

CHECK PILOT REPORT: CONRAD 9800 48 *Richard L. Sweeney*

Structural changes and fuel-injection mark this Twin-Beech conversion

BRITISH ENGINES FOR FUTURE BUSINESS FLYING 50 *A. T. Gregory*

Rolls-Royce, Bristol Siddeley and de Havilland prepare for a new market

EAGLE WITH ONE WING 52 *George S. Ross*

An amputee surmounts all obstacles to prove that he can fly with the best

MITCHEL FIELD 54 *Gerald J. Schlaeger*

Personality sketch of an airfield—its role in America's aviation history

EFFECTS OF DRUGS, TOBACCO, ALCOHOL 56 *John T. Flynn, M.D.*

Everyday habits seem harmless on the ground, can be dangerous in the air

AT LAST THE WIND 57 *Dick Bach*

Two modern-day pilots discover the thrill of an open-cockpit monoplane

FLYING FEATURES

Mailbox 4
Briefings 8
Who and Where 13
New Products 13
Flying Calendar 14
Picture Credits 80
Hangar Flying 76
Have You Read? 27
Flying Newsreel 58
I Learned About Flying From That 60
Thrust Lever 62
Christmas Finds 64
Advertising Index 102

THIS ISSUE of FLYING again reflects the extensive traveling of this magazine's editors and writers: to Europe for engine coverage; to the north and far west for on-the-spot aircraft pilot-reports; to the midwest and south for airport development. Time-distance is no barrier to features reflecting reader interest.

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WINGS and THINGS

PIPER'S new all-metal, low-wing Cherokee, probably FAA certificated at this printing, will be powered by a 160-hp Lycoming engine. Four-place airplane, designed by Fred Weick, will be in the $10,000 price class. Two prototypes now are flying, minus soundproofing, one of which is undergoing accelerated service testing. The smaller, two-place, 108-hp Colt 108 (initially called "Pinto"), unveiled last month at West End, Bahamas, reportedly will sell at a basic price of $4,995.

BRANTLY HELICOPTER CORP., *Philadelphia, Pa., contemplating production of a six-place rotorcraft to complement their two-place 180-hp B-2. New helicopter would incorporate two engines, and be of tandem design, using two B-2 rotors.*

SCHWEIZER AIRCRAFT CORP., Elmira, N. Y., readying for production its two-place, side-by-side, low-wing Model 2-31, a development of the single-place 1-30. Prototype has been flying since July, powered by a 65-hp Continental. Flying at a gross weight of 1,475 pounds, the two-place 2-31 exceeded speed of the earlier 1-30, powered by the same engine. Production 2-31s will be stressed to carry 90- to 100-hp engines. Aircraft will be offered in the low-cost category, also in kit form.

AIRCRAFT SALES ARE JUMPING. *Beech will exceed their 1960 retail projection of $60 million, with an approximate $10 million commercial increase above 1959. This represents almost 50 per cent of the company's total gross volume, military sales taking the other half. For 1961 Beech expects retail sales of over $75 million. Cessna's 1960 sales will total over $103 million, including military, a 20 per cent jump above 1959. Commercial sales approximated $56 million, compared with 1959's all-time high of $46.6 million. Piper's volume in fiscal 1960 exceeded $40 million.*

NEW "LIGHT-LIGHT TWIN," in the works at Cessna but not yet airborne at this writing, reportedly is a four-place pusher-puller type aircraft, with fore-and-aft powerplants. The new entry into the commercial field probably will be a twin tail-boom configuration, available in 1962. Single-engine performance involves no yaw problems. Cessna will come out in 1963 with a six- to 10-place "heavy-light" twin.

NAVION'S *new five-place Rangemaster, of which the prototype is flying, will cruise at 173 mph (6,000 ft., 60 per cent bhp) with a range of 1,510 miles. Fuel consumption is 11.7 gph from tanks totaling 108 gallons. Production aircraft will be available next month; final jigs joined the company's Galveston, Tex., assembly line in mid-November.*

ROLLS-ROYCE DART turboprop, which powers West Coast Airlines' Fairchild F-27s, now running 2,200 hours between overhauls, a jump of 200 hours in TBO. Dart engines were introduced in North America on the Trans-Canada Airlines Viscount in 1955; TCA is now running type trials—on a group of specified engines in four classifications—3,100, 3,200, 3,300 and 3,400 hours—looking toward another rating increase.

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MAILBOX

INSURANCE PROBLEMS

I have read your magazine fresh off the newsstands for years, and finally bought a three-year subscription. . . . I have owned my own plane, using it strictly for pleasure but, finding it too expensive to keep as an individual, finally sold it. I joined a flying club, Skyways, Inc., here in Phoenix and have been flying the club's planes now for over a year. I've read many letters from subscribers extolling the benefits of flying clubs as a means of making private flying available (financially, that is) to the average salaried owner.

I got a rude awakening the other day. For no explained reason we had our insurance cancelled out on us. The only explanation from the agent was that he had had rather expensive claims (not from us) and that if he never wrote another aircraft policy, it would be too soon for him. . . . My own insurance broker tells me, "No one will insure a flying club plane for hull insurance and, further, liability insurance premiums are almost double an individual's rates." He had written his principals and they quoted a fantastic figure for liability but refused to quote him on hull, suggesting that he write to Lloyds of London.

Mind you, we have not had a single claim or accident in over a year, and we have 10 members with flying time from three to 400 hours. The plane has been made available to a fixed-base operator when we weren't using it, and we have rented it ourselves to properly licensed pilots after an extensive check ride. Now he tells us the insurance company which cancelled us out would probably have given back our premiums rather than honor the claim, due to the fact the initial insurance was written for the original two owners and not transferred when the club was formed and incorporated. . . . Could you please enlighten us?

DANIEL F. KENNEDY

Phoenix, Ariz.

● *A leading aviation insurance company was asked to comment. They replied: "We know of no American aviation insurer which has a blanket prohibition against insuring any group or type of flyers or flying.*

"Individual case evaluation and premium determination are, and have been, essential characteristics of aviation underwriting. Unlike cars, trucks or buses which can be readily categorized, aircraft are subject to limitless variations in operational environment and cannot be labeled 'acceptable' or 'unacceptable' solely because of the type of ownership or flight operations. Under such circumstances, it is not likely that a half dozen individual American insurers would hold the same opinion on a given risk.

"As in the case of any important purchase, careful analysis of one's needs for both insurance protection and services is essential. Underwriters do recognize, however, that some insureds prefer to place their primary concern on the side of the premium. Overseas coverage is generally sought in such cases."

A LESSON IN PHYSICS

I'm prompted to write about my flying incident which was similar to one reported in "Hangar Flying" in the September issue, called "A Lesson in Physics."

My lesson in physics was even more prosaic, as it was caused by an inspector's insistence that my gas caps be painted red, which was done by the A&P with thick paint and a brush, effectively sealing off the air vents in my Cessna 120. I also made a successful dead-stick landing about a half-hour after takeoff from Big Bear Lake, with some fine assistance from the Ontario (Calif.) tower. The emergency was due to running out of air in the gas tanks.

However, the kicker to the story is that on my next flight, after having gone over the first incident with the A&P and the inspector, I landed at Big Bear to find gasoline pouring out from the trailing edge of the left wing near the fuselage. My guess was confirmed by removing and inspecting the left tank. It had collapsed from the previous vacuum and a weak spot near the drain had given away. Had the quantity or capacity of each tank been checked after the first incident, another near-miss would have been prevented.

The moral: running out of air in the gas tanks is just as bad as running out of gas.

S. G. WHITE, M.D.

Canoga Park, Calif.

AIR RACE HISTORY

In your September issue, in the "Have You Read?" column, you have a review on David Cooke's book (Racing Planes That Made History, G. P. Putnam's Sons), in which it states that "the P-51 won the Bendix and Thompson trophies in 1946."

If I remember right, it was a Bell P-39 flown by Bell's test pilot, Tex Johnson. It was the most thrilling race I've ever seen, particularly Mr. Johnson's takeoff. With full flaps and his gear retracting, he climbed at

least 200 feet above the other fighters at the starting flag. Johnson took the lead in the Thompson, and held it all the way. Anyone who was there could never forget it. It is true a P-51 won the Bendix (that year) but not the Thompson.

So, who is wrong? You, me or Mr. Cooke?

L. N. CRIM JR.

Fort Worth, Tex.

● *Neither you nor Mr. Cooke. The 1946 Thompson was won by Tex Johnson, flying a Bell P-39Q.*—ED.

RESTRICTIVE PRACTICES

With the thoughts of Frank Taylor, October "Mailbox," and of W. T. Nelson, July "Mailbox," concerning the future of private aviation, I must completely agree.

I, too, have found airport operators who restrict, penalize, and discourage flying

(Continued on page 6)

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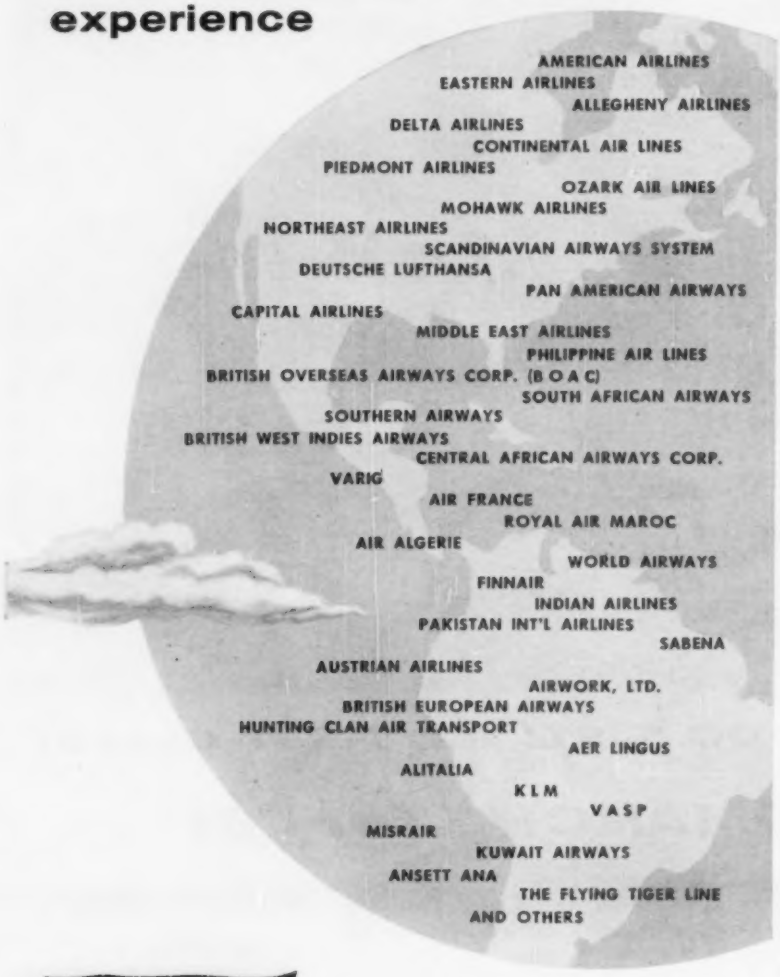

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MAILBOX

(Continued from page 4)

clubs. I have found that those people who are associated with general aviation would prefer to deal with, talk to, and sell only to doctors, lawyers and Indian chiefs, company executives and corporations. The vast market of the American public is to be ignored. I feel that your publication is guilty of the same feeling when I find so many articles concerning company pilots, corporation experiences, business fleets and articles primarily concerning aircraft available for this general class of business.

The American economy was not built to its tremendous capacity on this basis. The automobile industry did not reach its present size by selling cars only to industry. The overwhelming success of boating . . . wasn't an accident . . . swimming pools didn't just suddenly appear magically in so many back yards.

One of your articles states, "Some 9,000 aircraft should be sold this year." I hope that the aircraft industry is not proud of such poor production in a country as great as ours.

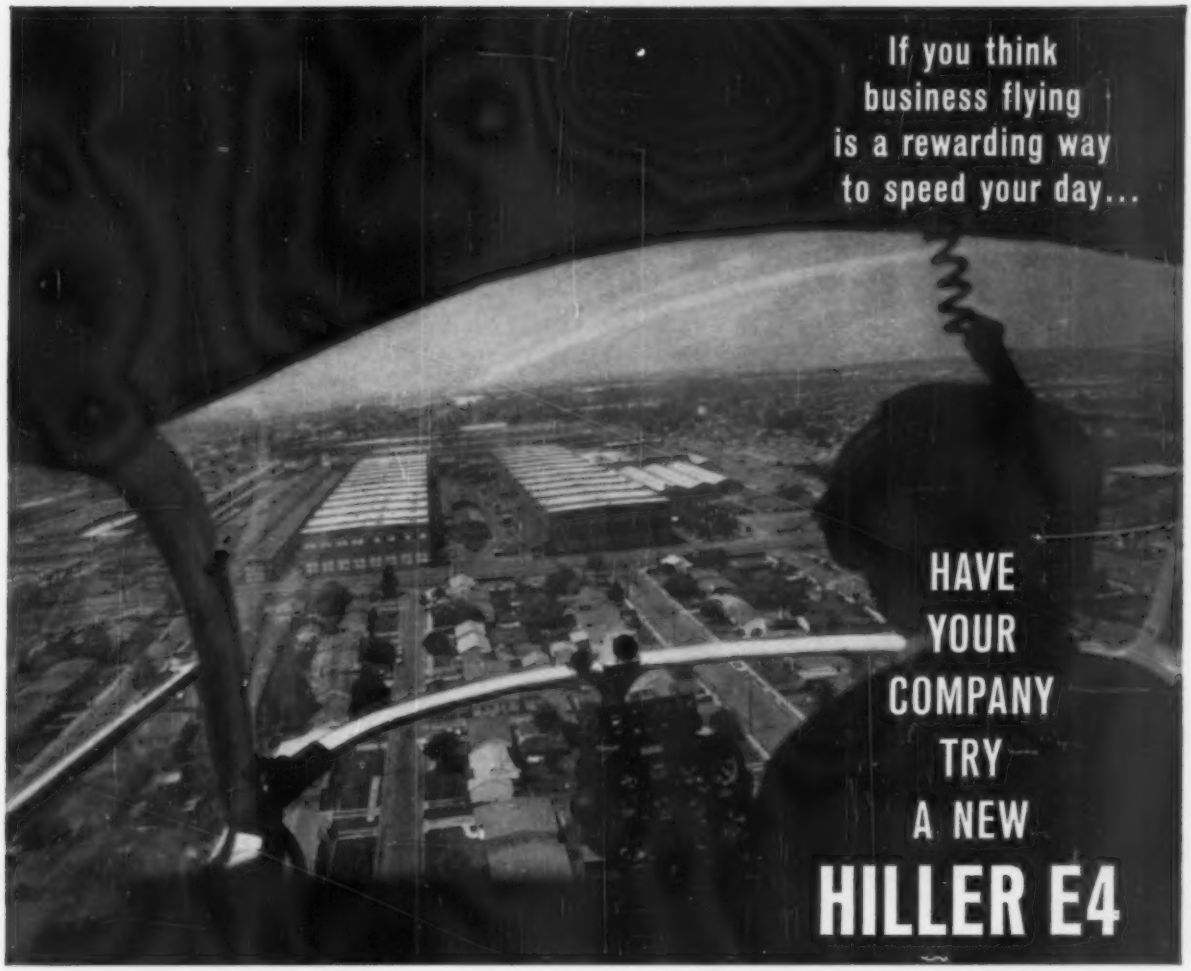
I feel it safe to say that there are more people than corporations in this company. If general aviation would recognize this fact, a vast new market could be opened . . . for its small planes. Our wealthier wingmen would have a larger market for their used aircraft as they themselves move up to larger ones. The explosion of success has occurred in other industries and there is no reason that it cannot take place in aviation.

WILLIAM C. MARKLEY
Audubon, Pa.

Amen, to Mr. Frank Taylor's letter in your October issue. The high-charging, exorbitant rate operators (who charge two to three dollars to tie down a 150 Cessna *after* I buy 16-18 gallons of gas) are the same ones who cry how bad business is and how little they make. They've been around in varying quantities for years . . . and are still too prevalent for the good of flying.

. . . An exception here in Atlanta is Cecil Gilham, owner-operator of Fulton Air Service at Fulton County Airport. Cecil's fleet of Cessna 150s are buzzing around constantly, averaging 8-900 hours per year, each at rates of $8 per hour solo for the trainers, $10 solo for a dual-omni equipped Commuter with a standard $4 per hour for instruction including instruments! That's right, $14 per hour for an instrument rating. His planes are maintained well enough to satisfy a fussy old pilot and A&P (me) and are always spotless. Long (overnight) XCs are $10 per hour solo, regardless of model, trainer or Commuter, if you sign up far enough in advance. . . . Mr. Gilham is a smart enough businessman to realize a lot of hours pays better than a few. . . . Tell Mr. Taylor to move to Atlanta. There's still room for a few more in the Fulton's stable. And I'm not an employee. I'm a customer.

ALBERT D. TRAGER
Atlanta, Ga.



How many of these confront your company? Getting executives from plant to plant takes too long. Driving to the airport takes longer than the flight. Isolated construction projects bog down for lack of supervision or parts. Sales department needs something to give clients bigger perspective.

The Hiller E4, new sister ship of the world famous 12 E, flying workhorse that holds aviation records, solves these ***two*** *ways.*

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Two: *A flying pickup truck. E4's are built to haul cement, dynamite or reinforcing steel. Even the big passenger area converts to cargo space.*

Cost? *The most economical 4-place copter in the air!*

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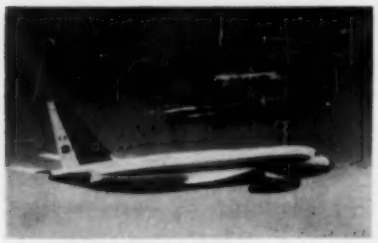
Pedigree: *Sister ship of the E4 in action above is the 3-place Hiller 12 E. One 12 E rewrote aviation records by landing and picking up payload at 18,000 ft. on Mt. McKinley, Alaska. Others erect power lines singlehandedly, help geologists hunt for oil, fly police patrol, fight forest fires. It is the first choice of commercial helicopter fleet operators throughout the world. The U.S. Army's low maintenance champion, the Hiller H-23D Raven, is the ship behind it all. It supplied the Army-proved drive and rotor systems, as well as the rugged, solid airframe that characterizes the line.*

HILLER AIRCRAFT CORPORATION PALO ALTO, CALIFORNIA

BRIEFINGS...

Speedy trio. The world's fastest airliner, fastest bomber and fastest interceptor—all built by Convair—make an unusual picture in flight formation high above the California desert. The 880 transport (*foreground*)



cruises at 615 mph in level flight. The B-58 Hustler (*center*) flies more than twice the speed of sound, while the F-106, a Mach-2 all-weather interceptor, presently holds the world's speed record at 1,525 mph.

Active civil aircraft now registered total 70,747, according to FAA's latest figures. Over one-third of these are located in five states. California leads with 9,000, followed by Texas with 6,000, Illinois with nearly 4,000, then New York and Ohio with approximately 3,400 each.

U.S. business firms, according to a recent FAA survey, operate close to 5,000 aircraft and have 6,172 professional pilots on their payrolls. Of the fixed-wing aircraft 3,459 are multi-engine, 1,417 single-engine. Helicopters number 116. One-fourth of the multi-engine aircraft are in the 12,500-pounds-up category. Light twins, the largest single group, are owned and operated by the 3,284 firms.

Nationwide distributor-dealer organization to handle sales and service for its new SP-3 automatic pilot system for the general aviation market has been established by the Sperry Phoenix Co., a division of Sperry Rand. Beech Aircraft has agreed to the manufacture and sale of installation kits and factory installation of the SP-3. Similar arrangements are in negotiation with other manufacturers. To date this equipment is FAA-approved for a variety of Beech, Cessna, Aero Commander and Piper aircraft.

Factory modification to extend the frequency range of their NAVCOM 100 navigation/communications system to 135.95 mc with 50 kc spacing has been announced by Motorola as a service to present NAVCOM 100 owners. The company also plans to offer the unit with extended frequency as original equipment and, at the same time, retain 126.9 mc with 100 kc spacing in its product line. Motorola is extending the frequency range because of FAA's announced plans to increase frequency limits on both VHF transmitters and receivers through 135.0 megacycles by July 1963.

Air Force humpty dumpty is the latest in cold weather survival clothing for use in jet bombers and space capsules. Miniaturized by Gerry Inc., of Boulder, Colo., the seven-item outfit is vacuum packed into a 5x7x10-inch box or can be stuffed into the small carrying sack shown. The dual purpose coat converts to a sleeping bag. A small quantity of these garments now are being made available to the public.

The Canadian government has established a National Air Museum at Ottawa's International Airport in commemoration of the nation's Golden Anniversary of Flight in 1959. A small part consists of relics from pioneering days; the remainder relates to the industry's growth and current breadth. Operable displays demonstrate basic principles of aerodynamics, aircraft design and engine operation. A special museum for youngsters is included.

The Piper Cub recently marked its 30th anniversary. To celebrate, brief ceremonies were held at the Lock Haven, Pa. plant. On hand were William T. Piper Sr., and George W. Kirkendall of Suffield, O., the

first pilot to fly the 37-hp E-2. Highlight of the event was an E-2 Cub (*above*) flying at 55 mph, with owner Luther Johnson, of Greenville, S. C., at the controls; while, climbing up from below to salute it, was the latest of the Piper stable, a 500-hp twin-engine Aztec.

Aero Commander, Inc., is the new corporate name for Aero Design and Engineering Co., Bethany, Okla., manufacturers of the twin-engine executive aircraft known by that name. The change, according to Tom Harris, vice-president and general manager, is primarily to simplify corporate identity.

Chatham Aviation Company, recently moved to enlarged facilities at Morristown (N. J.) Municipal Airport now is equipped to store and service "anything from Cubs to DC-6s." Chatham's facilities include a 120 x 140-foot hangar, with

slotted door to accommodate high-tail aircraft, and administrative quarters with large glass-enclosed lounge and aircraft display room. Offering a complete line of Cessna aircraft, the company is headed by Angelo Sarubbi.

National Pilots Assn. is opening its membership to a limited number of people active in general aviation, but who do not hold pilot's licenses, as associates. They will pay the same dues as members, receive the same services, but will not be entitled to vote. Prime requisite for associate membership is interest in the association work.

By filing an advanced flight plan, general aviation pilots now can receive radio reports en route on the latest weather conditions, airport conditions and air navigation aids as they fly over, or near, FAA flight service stations on the pre-announced course. Nearing a station, the pilot identifies himself and a specially trained "pilot weather briefer" relays the current information previously prepared for him. Full details of

(Continued on page 106)

One-stop service. New control tower at Tucson Airport houses the weather bureau and communications, handy for flight planning. The tower also is the "flight line" with 24-hour service and all grades of fuel and oil. Fifty feet to the east is the nation's first RONtel (*left*) with parking apron for private planes at the door. The airport, Arizona's "finest," has 12,000 feet of lighted runways and taxiways; charges no tie-down or landing fees.

CERTIFIED TO TSO

A new panel-mounted ADF System with its own shock mounting

ARC's new, unique ADF 318A System is, without question, the finest panel-mounted automatic direction finder. No matter where you fly, it assures the utmost in reliable navigation.

NEW EASE, CONVENIENCE, PRECISION.

Weighing only 18.4 pounds, the 318A is panel-mounted for fingertip, eye-level convenience. No remote tuning mechanism or motor is required.

It has its own single or dual shock mounting system, independent of any shock mounting panel in the aircraft itself, for maximum vibration isolation.

The 318A is equipped with a high-precision, five-section, temperature-compensated tuning capacitor. Its RF and IF transformers are hermetically sealed, assuring all-weather, all-altitude protection and long life.

It is the only panel-mounted ADF system available with a mechanically compensated loop providing 14 compensation steps for directional errors up to 25° with no loss in sensitivity. Uses improved DV-14A Power Unit, plus IN-318A Indicator.

CRAFTSMANSHIP AND ECONOMY COMBINED.

Certified to TSO, the ARC 318A offers matchless performance combined with hard-headed economy . . . another great contribution to flying reliability by Aircraft Radio Corporation.

Starflite II
ARC ADF
MODEL 318A

ARC Starflite II

NEW SYMBOL OF RELIABILITY. The new ARC Starflite emblem on the COM/NAV equipment you select is your assurance of the ultimate in reliability. Every ARC Starflite product, whether designed for compact economy planes, or larger aircraft, is unmatched in craftsmanship and performance. Make sure the Starflite emblem appears on the airborne electronic equipment you buy.

See your ARC Dealer, or Write Today for Further Information and Prices.

Aircraft Radio Corporation
BOONTON, NEW JERSEY

RESEARCH, DESIGN, DEVELOPMENT AND PRODUCTION OF ELECTRONIC EQUIPMENT SINCE 1928

ONE YEAR

Now! A full year's warranty stands behind the new "Gold Seal" Tactair T-3 autopilot. This is the most far-reaching warranty ever offered by any aircraft accessory manufacturer. It means a FULL YEAR warranty on all autopilot components ; a FULL YEAR warranty on the gyro horizon that keeps you unerringly straight and level and precisely controls angle of bank; a FULL YEAR warranty on the directional gyro with its exclusive Tactair course selector and heading lock. Chances are a Tactair autopilot in your airplane* will never need warranty service, but it's assuring to know that Tactair will replace or service free of charge *any* component to assure your continuing satisfactory enjoyment of the finest automatic pilot available for your airplane.

***Approved on most Beech's, Cessnas, Piper Apache.**

NOW! FULL-YEAR warranty covers new "Gold Seal" Tactair T-2 Levelair, also

TACTAIR

INCORPORATED

BRIDGEPORT, PENNSYLVANIA

Flies like a big airplane ■ has the speed of a big airplane ■ is roomy like a big airplane ■ has the range of a big airplane ■ totes useful load like a big airplane . . .

the new 5-passenger 1961 Rangemaster

NAVION IS BIG

. . . but the cost is small! Send for our new color folder "1961 Navion Rangemaster."

Navion AIRCRAFT COMPANY

P. O. Box 3126, GALVESTON, TEXAS

Division of Tusco Corporation

AERO COMMANDER

680H

THE ALL-NEW PERFORMANCE CHAMPION OF BUSINESS AIRCRAFT

TOP SPEED 290 mph

CEILING 28,500 ft

GROSS WEIGHT 8,000 lbs

USEFUL LOAD 3,200 lbs

RANGE 1,400 miles

NEW, COMPACT SPEED-LINE NACELLE

AERO COMMANDER

AERO DESIGN & ENGINEERING CO • BETHANY, OKLAHOMA

COMPARE THESE PRELIMINARY PERFORMANCE DATA WITH ANY OTHER BUSINESS AIRCRAFT IN ITS FIELD!

The Aero Commander 680F sets new standards of brilliant performance! The efficient streamlining of the compact, new SPEED-LINE design combines with supercharged power to deliver top speed of 290 mph. *Cruising speed,* 244 mph!

NEW FUEL INJECTION

New supercharged Lycoming IGSO-540 fuel injection engines develop 360 hp at 3,200 rpm at sea level! Initial rate of climb at sea level is 1,660 fpm! Yet at 55 per cent power, normal fuel, the 680F will span 1,400 miles with 30 minutes' reserve!

SINGLE ENGINE CEILING

Here is *high flying!* Service ceiling, 2 engines, is 28,500 feet. The *single engine service ceiling is 16,100 feet!* Yet the 680F is an 8,000 lb aircraft with *3,200 lbs of useful load!*

NEW LUXURY, TOO

New sound insulation and above-the-wing exhaust maintain WHISPER-QUIET within the elegant cabin. Foam-filled, reclining chairs and the colorful interior feature rich fabrics and genuine leather: *flying comfort unsurpassed!*

CALL OR WRITE FOR COMPLETE DETAILS OR VISIT YOUR NEAREST DISTRIBUTOR TODAY!

WHO and WHERE

Edward J. Eigeman is the new president of Vest Aircraft and Finance Company, Denver, succeeding the late Don Vest. E. B. Jeppesen has become vice-president; Jackson M. Sewell, secretary.

James V. Crawford is moved up to assistant manager, AiResearch, Los Angeles division; Dr. John Mason to chief engineer, and Richard W. Winslow to chief of preliminary design.

G. Ward Hobbs has been named director of FAA's Bureau of National Airports. A 25-year man with American Airlines, Hobbs was most recently with Capital Airlines.

Carlos B. Wood has succeeded Michael E. Gluraheff, who recently retired, as engineering manager at Sikorsky Aircraft. Wood formerly was director of advanced engineering at Douglas Aircraft.

Charles Clauer Jr., has been appointed by Switlik Parachute Co., Trenton, N. J. to manage the company's sales, both foreign and domestic.

William E. Diefenderfer is upped to assistant general manager, Hamilton Standard Div., United Aircraft; Donald G. Richards takes over as engineering manager.

Bliss K. "Ted" Thorne has joined Pan American's New York public relations department. He is a former member of the New York Times editorial staff.

W. E. "Walt" LaVelle, Beech Aircraft, has become manufacturing manager of the company's Boulder, Colo. division. Leonard J. Markowski to export sales division.

Hal Householder has joined Van's Air Service Inc., as sales representative, at Truax Field, Madison, Wis. Also Claude J. Frickleton, to head flight school and charter service.

John W. Briggs, formerly with the Military Air Transport Service, heads FAA's new aircraft fire-rescue program in the Bureau of Facilities and Materiel, Airport Division.

William G. Robinson, Cessna Aircraft, has been appointed corporate director of public relations. Rankin L. Griesinger, to manager, public relations, commercial aircraft, marketing division.

James V. Bernardo, long associated with CAA-FAA, has accepted appointment as chief of Educational Services, National Aeronautics and Space Administration, Washington, D. C.

Walter T. Bonney, formerly director of office of public information for NASA and its predecessor NACA, has joined the Aerospace Corp., El Segundo, Calif., as director of public information.

Clyde Barnett, director, California Aviation Commission, has been elected president of the National Assn. State Aviation Officials; R. L. Cunningham, Indianapolis and Harold Vavra, Bismark, N. D., 1st and 2nd vice-presidents. Re-elected were treasurer Dale MacIver, Minneapolis and executive director A. B. McMullen, of Washington, D. C.

Edward R. Cain succeeds V. E. Larimer as vice-president and general manager of Atlantic Aviation, Wilmington, Del. Wilmer D. Crawford to sales manager, New York division, and William A. Haskell at Boston to ass't vice-president and general manager, succeeding John M. Erskine.

Grace M. Bierman, Washington, D. C., is appointed chief of public information, Civil Aeronautics Board.

Sherman M. Fairchild, Fairchild Engine & Airplane Corp. board chairman, has become acting chief executive of the firm following resignation of J. H. Carmichael.

Harold H. Warden has taken over newly created post of sales manager for Pacific Airmotive's Burbank, Calif., aircraft division and PacAero Engineering Corp.

Dr. William Requarth, Decatur, Ill., elected president National Pilots Assn.; L. W. White, Portland, Ore. and Reed Thompson, Lima, O., 1st and 2nd vice-presidents. David H. Scott, and Frederick B. Lee, Washington, D. C. to secretary and treasurer, respectively.

NEW PRODUCTS

New economical fuel-injection system for reciprocating engines up to 600 hp is announced by the Bendix Products Div., The Bendix Corporation. Known as the RS Fuel Injection System for light and corporate airplane engines, it consists of a unit that accurately measures air flow to the engine, a servo-operated fuel proportioner, a mixture control, and servo-operated discharge distributor. The system can be used for either intake valve port or single-point impellor injection.

Cushman Motors, Lincoln, Nebr., has placed on the market a new model electric-powered, three-wheel utility vehicle for airport transportation. Called the Cushman 734 Truckster, it carries four passengers, an operator, plus luggage or other items. It has a turning radius of six feet, 10 inches, a ground clearance of five inches, and operates approximately 50 miles before recharging of its 36-volt motor.

Wing tip tanks for the Piper Comanche, of heat-treated aluminum, in 15-gallon capacity, are available from Brittain Aircraft Enterprises, 664 E. Regent St., Inglewood, Calif. Designated Mark III, these tanks are available in a complete kit for $895, with necessary tubing, fittings, and hardware. FAA-approved, the installation requires no major rework or modification of the wing; may be completed by the average mechanic without special jigs.

New easy-to-apply airplane wax (trade name: Sur Luster) is being marketed by Donahue Distributing, Inc., Box 1, Berea, O. Average time for polishing a single-engine aircraft is said to be about four hours. One pint of pre-wax cleaner and 13½-ounce can of wax ($7.25 postpaid) is enough for entire plane.

What do you want in an Airplane?

SPEED? The Bellanca "260" cruises at 203 mph and has a top speed of 208 mph.

PERFORMANCE? The Bellanca needs but 400 feet of runway for take-off, climbs at 1750 fpm, has a 22,000 ft. service ceiling, over 1,000 mile range at 200 mph speeds. We invite your comparison with other business aircraft.

SAFETY? The excellent design, plus careful craftsmanship during construction, have made the Bellanca "260" one of the most stable airplanes in the air.

ECONOMY? The "260" is economical to operate. Requires less maintenance.

FEATURES? The Bellanca is all new—all over. See for yourself the functional instrument panel, comfortable contoured seats and beautiful interior appointments, plus dozens of other new features.

Visit your Bellanca dealer or distributor and have him show you why . . .

The Bellanca "260" has what Pilots want in an airplane!

DOWNER DEALERS AND DISTRIBUTORS:

Chamberlain, S. Dak. Bruno's Aviation Sales
Chattanooga, Tenn. Skycraft, Inc.
Chicago, Illinois Commercial Aircraft, Inc.
Cincinnati, Ohio Aviation Center, Inc.
Cleveland, Ohio Aircraft Sales, Inc.
Denver, Colo. Ronald Brinkhoff
Detroit, Michigan Bond Aircraft, Inc.
Dublin, Georgia Georgia Aviation School
Edmonton, Alberta, Can. National Servicair Co., Ltd.
Falls City, Nebraska Garner Flying Service
Fargo, N. Dak. D.A.K. Aviation Co., Inc.
Fort Lauderdale, Florida Broward Aviation, Inc.
Grand Forks, N. Dak. Montgomery Aircraft Sales
Grand Prairie, Texas Grand Prairie Airport
Grant, Nebraska Plains Aviation Co.
Hereford, Texas Hill Aircraft Sales
Hollister, Calif. B & C Flying Service
Manchester, New Hamp. B & M Aviation Corp.
McPherson, Kansas Sky-Tel Service
Miami, Florida Universal Air Service, Inc.
Minneapolis, Minn. Lake Land Skyways, Inc.
Minneapolis, Minn. Minnesota Airmotive, Inc.
Moline, Illinois Goode Aircraft Sales
Newcastle, Wyoming Gus Sherwin
New York, N.Y. De Sola Bros., Inc.
Ord, Nebraska Ord Aircraft Sales
Philadelphia, Penn. Hi-Line Aviation
Phoenix, Arizona Mercury Flying Service, Inc.
Plainview, Texas Miller Flying Service
Reedsburg, Wisconsin Voss Air Service
Riverside, California Land-Sea-Air, Inc.
Salt Lake City, Utah Kimball Aircraft Co.
Santa Ana, Calif. Torbet Aircraft, Inc.
Scottsdale, Arizona Dietz Sky-Sails
Spencer, Iowa S & W Aviation Sales, Inc.
Toledo, Ohio Exec. Flight Con. Serv., Inc.
Torrance, Calif. "Slim" Kidwell Aviation Co.
Tracy, Calif. Haley Flying Service
Trinidad, Colorado Perry F. Stokes
Tucson, Arizona Mercury Flying Service, Inc.
Washington, No. Carolina Stancil Flying Service
West Bend, Wisc. Harris Aircraft Sales
Zion, Illinois Business Aircraft Sales, Inc.

FOREIGN

Chester, England Aircraft Associates, Ltd.
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Key market areas are still available for exclusive Bellanca Sales Franchises.
Call or write today.

DOWNER AIRCRAFT INDUSTRIES, INC. • Alexandria, Minnesota

FLYING CALENDAR

November 30, December 1-2—Futuronics Exposition, Roosevelt Raceway Exhibit Hall, Westbury, N. Y. Sponsored by Long Island Manufacturers Council, includes exhibits by Sperry, Grumman, Fairchild Camera and Instrument. Theme of the technical meetings will be Forecasts in Electronics, with different sessions covering Systems Concepts, Component Developments, and U.S. Government Needs. Roosevelt Raceway is 45 minutes from New York by parkways.

December 1-2—Week end flight of the Florida Aero Club to West End, British West Indies. Contact: Harry B. Collins, Director, 375 N.W. 15th St., North Miami Beach 62, Fla.

December 2-4—Annual Open House and Display of full line new 1961 Beechcraft, sponsored by The Norman Larson Co. of Van Nuys, Calif. Fly-in, Drive-in. Desert Inn, Palm Desert Air Park, Calif.

December 5-8—Fifteenth Annual Meeting and Astronautical Exposition, Shoreham Hotel, Washington, D. C. The American Rocket Society.

December 5-11—Convention of the World Airline Employees, Las Vegas, Nev., at Hotel Sahara.

December 6-8—Twenty-first Annual Convention, National Aviation Trades Assn., Oklahoma City, Okla., at the Oklahoma-Biltmore.

December 16—The Annual Kitty Hawk Celebration of San Francisco Bay Area Chapter of the National Aeronautical Assn., at the Jack Tar Hotel.

December 17—Twenty-fourth Wright Brothers lecture, Natural History Bldg., Smithsonian Institution, Washington, D. C.

December 17—Kitty Hawk Dinner, Kansas City Aero Club, the President Hotel.

December 17—Kitty Hawk Dinner, the St. Louis Aero Club, St. Louis, Mo.

December 17—Kitty Hawk Dinner, Carolina Aero Club, Kitty Hawk, N. C.

December 28-30—Seventh King Orange International Model Plane Meet, Miami, Fla., includes the World Airline Scale Model Championships, open to personnel of any, and all, airlines. Sponsored by Air Training Corps Flying Club. Contact: Tom Sutor, 5313 Granada Blvd., Coral Gables 16, Fla. Over $5,000 in scholarships, trophies, etc., for first to third-place winners in 30 events.

January 12-13—Eighth Annual Meeting, Arizona Aerial Applicators Assn. Wigwam, Litchfield Park, Ariz.

January 16-18—Seventh Annual National Meeting of the American Astronautical Society, Dallas, Tex.

January 23-25—Twenty-ninth Annual Meeting of the Institute of the Aeronautical Sciences, Hotel Astor, New York City.

Calendar items must be received by FLYING's editorial office, 1 Park Avenue, New York 16, N. Y., two months prior to the event.

ALL-WEATHER CONFIDENCE BEGINS WITH COLLINS

Could your company plane take off tonight? The true worth of any aircraft is determined by its availability in unfavorable weather. Under such conditions, the greater value of Collins navigation, communication and flight control systems is particularly apparent. Are you and your passengers flying with Collins all-weather confidence? Contact your Collins distributor, or write direct for literature on your specific needs.

COLLINS

COLLINS RADIO COMPANY • CEDAR RAPIDS, IOWA • DALLAS, TEXAS • BURBANK, CALIFORNIA

Cessna
announces
a great
new airplane

THE SKYHAWK

and
a new, lower fuselage
—new visibility—new
instrument panel—new comfort
features—and a long list
of other improvements
for '61 in

THE CESSNA 172

—THE WORLD'S LEADING SELLER

CESSNA FOR '61

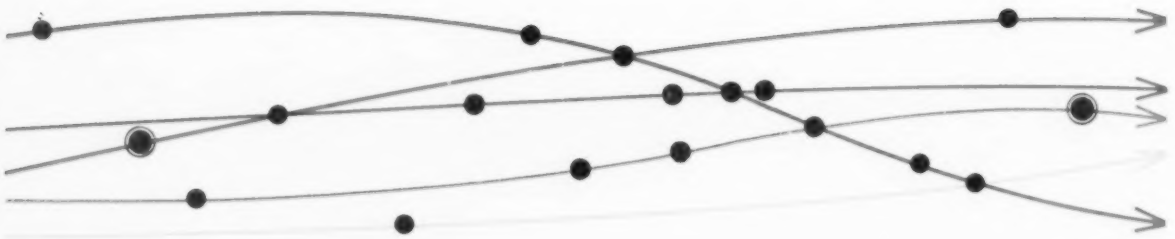
SKYHAWK 172

HIGH-WING STABILITY

ASK ANY BIRD

AIRLINE TERMINAL

CESSNAPORTS



How much mobility will I gain from 5400 extra Cessnaports? Squeezing **more** miles into **fewer** minutes — going whenever, wherever the need arises — is a **major must** in modern business. And you can meet these vital travel requirements as economically as in your car and far more flexibly than via commercial airliner — **in a Cessna!** And consider, too, this practical feat of multiplied mobility! Between lunch and dinner you can easily complete a 500-mile marketing or management trip . . . **along any point of the compass** at speeds up to 140 mph aboard a brilliantly styled Cessna Skyhawk/172 for '61! And you can **expect and get** an average of ten-to-one improvement in mobility over commercial airline travel . . . a positive promise made possible by the 5400 **extra** Cessnaports of opportunity which await your arrival located in between the 600 cities served by commercial airlines: The proof of your Cessna mobility is a matter of mathematics. See for yourself. See your Cessna dealer.

172

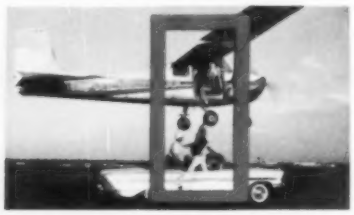
12 NEW CESSNAS FOR '61

In travel there's an ever-present problem . . . where does **transportation** end . . . and **comfort, convenience, and fun** begin? Best answer to this, the dilemma in which many modern men on the move find themselves . . . lies somewhere along the complete line of Cessna's for '61 . . . 12 great new opportunities to meet the demanding missions of today's highly competitive business world — and to enjoy relaxing time en route! Visit your Cessna dealer today, exercise your option to match the mission you have in mind with the world's most complete line of business aircraft for every performance level, every price range. Then sit back and enjoy the difference between work and pleasure as you travel! In brief, "What's your need . . . name your Cessna!"

For "flying like driving," you want powerful, safe brakes — and Cessna for '61 has the best! Die-cast parts provide superior heat conduction and dissipation — surer stops, longer brake life. Individual "toe-touch" pedals permit sharp pivots for superior ground handling. Nylon tubeless tires run cool and last longer.

You get Cessna's exclusive group of leadership features at its peak of brilliance in '61. The new, improved "Land-O-Matic" gear, now re-designed to lower the Skyhawk/172 three inches, makes flying more like driving than ever, with easier ground handling, a shortened step into the cabin. Cessna's "high-stability," all-metal wing provides a smoother ride, easier control, greater visibility, shelter from sun glare and heat, fullest clearance of ground obstacles. Cessna's all-metal construction adds permanence to your pride of ownership — adds dollars to resale value! And Cessna's great Para-Lift flaps get you up over obstacles in a hurry — down into small fields in slow and easy safety.

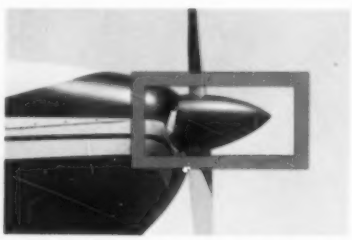
On floats or skis, the Skyhawk/172 adds thousands of places where other aircraft can't land to the already more than 6,000 Cessnaports available on land. Large Para-Lift flaps permit outstanding take-off and landing capabilities in small bodies of water. Passenger to cargo conversion takes only minutes and provides extra utility.



If you want to break the world's non-stop endurance flight record, the Skyhawk/172 for '61 is your pre-eminent choice! For the 172 holds both the present record — of 64 days, 22 hours, 19 minutes, and 5 seconds aloft — and the previous record! No one can ask for better evidence of Cessna stamina, reliability, comfort, and ease of flying than this.

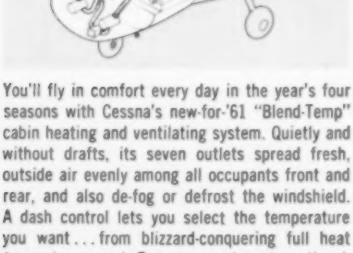
EXCLUSIVE ON THE SKYHAWK Your '61 Skyhawk offers the convenience of push-button, full-electric starting, with no mechanical intermediate drive. And this is only one feature of the many extras offered on the new flight/sweep Skyhawk panel . . . turn and bank indicator . . . rate of climb indicator . . . sensitive altimeter . . . horizon gyro and directional gyro . . . all located for eyes-on-the-road operations . . . standard on the Skyhawk!

Your convenience is more fully served than ever in '61! Consider the big, new exterior baggage compartment door — offered for the first time on Cessna's biggest-selling models for easy access to the big, 120-lb. capacity luggage area. New cabin door locks, too, afford greater ease of operation and security.

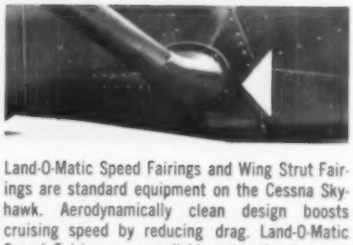


The look of "Jet Age" styling begins far up front on the Skyhawk/172 for '61, making its point with the new "needle-nose" propeller spinner. It houses a clipped-tip, one-piece forged aluminum alloy propeller, specifically designed to utilize the full power of the Continental engine.

A touch of the throttle unleashes a full 145 hp from the precision-balanced, instantly responsive six-cylinder Continental engine . . . the same engine that powered the Cessna 172 to two world's non-stop endurance records. Two independent magneto-powered ignition systems, each fully radio-shielded, are teamed to provide positive power flow with maximum economy. Dual stainless steel mufflers control the sound of full-throated power. New speed-stream cowling design gives a dynamically modern "go ahead" look to the forward thrust of the Skyhawk/172 for '61! And an engine-driven vacuum system is standard equipment on the Skyhawk.



You'll fly in comfort every day in the year's four seasons with Cessna's new-for-'61 "Blend-Temp" cabin heating and ventilating system. Quietly and without drafts, its seven outlets spread fresh, outside air evenly among all occupants front and rear, and also de-fog or defrost the windshield. A dash control lets you select the temperature you want . . . from blizzard-conquering full heat to maximum cool. Two rear seat vents optional.



Land-O-Matic Speed Fairings and Wing Strut Fairings are standard equipment on the Cessna Skyhawk. Aerodynamically clean design boosts cruising speed by reducing drag. Land-O-Matic Speed Fairings are available as optional equipment on the Model 172.

PERFORMANCE / SPECIFICATIONS

	SKYHAWK	172B	FLOATPLANE
GROSS WEIGHT	2,200 lbs.	2,200 lbs.	2,220 lbs.
SPEED:			
Maximum at Sea Level	140 mph	139 mph	104 mph
Maximum Recommended Cruise, 70% Power at 8,000 ft.	131 mph	130 mph	101 mph
RANGE:			
Maximum Recommended Cruise, 70% Power at 8,000 ft.	570 miles	565 miles	440 miles
39 Gallons, No Reserve	4.4 hours/131 mph	4.4 hours/130 mph	4.4 hours/101 mph
Maximum Range at 10,000 ft.	790 miles	790 miles	550 miles
39 Gallons, No Reserve	7.9 hours/100 mph	7.9 hours/100 mph	8.0 hours/69 mph
RATE OF CLIMB AT SEA LEVEL	730 fpm	730 fpm	550 fpm
SERVICE CEILING	15,100 feet	15,100 feet	11,150 feet
TAKE-OFF:			
Ground Run	780 feet	780 feet	1,620 feet
Total Distance Over 50-Foot Obstacle	1,370 feet	1,370 feet	2,390 feet
LANDING:			
Landing Roll	680 feet	680 feet	590 feet
Total Distance Over 50-Foot Obstacle	1,115 feet	1,115 feet	1,345 feet
EMPTY WEIGHT (Approximate)	1,325 lbs.	1,255 lbs.	1,410 lbs.
BAGGAGE	120 lbs.	120 lbs.	120 lbs.
WING LOADING: Pounds Per Square Foot	12.6 lbs.	12.6 lbs.	12.8 lbs.
POWER LOADING: Pounds/HP	15.2 lbs.	15.2 lbs.	15.3 lbs.
FUEL CAPACITY: Total	42 gals.	42 gals.	42 gals.
OIL CAPACITY: Total	8 qts.	8 qts.	8 qts.
POWER: Continental Engine O-300-D for Skyhawk, O-300-C for 172B, 145 Rated HP at 2,700 RPM			
PROPELLER: McCauley Fixed-pitch	1C172/EM7653	1C172/EM7653	1A175/SFC8040
WING SPAN	36 feet	36 feet	36 feet
WING AREA	174 sq. ft.	174 sq. ft.	174 sq. ft.
LENGTH	26 feet 5.5 inches	26 feet 5.5 inches	26 feet 5.5 inches
HEIGHT	8 feet 8 inches	8 feet 8 inches	9 feet 11 inches

STANDARD EQUIPMENT

Altimeter, Standard
Arm Rests, (Two)
Ash Trays, (Four)
Attachment Provisions (Cargo Rings, Shoulder Harness, and Sun Visors)
Battery, 12 Volt
Brake, Parking
Brakes, Hydraulic Toe-Operated
Carpet
Compass, Magnetic
Control, Fuel Strainer Drain Remote
Control, Mixture (With Safety Lock)
Cushions, "Polycloud" Seat
Defroster, Windshield
Door, Baggage Compartment Outside
Filter, Carburetor Air
Flaps, Paralift Wing (Manual)
Fuel System, Gravity Type
Fuel Valve, Four-Position Selector
Gage Unit, Engine (Includes Oil Pressure, Oil Temperature, and Two Electric Fuel Gages
Generator, 20 Amp. 12 Volt
Heating System, Cabin
Heating System, Carburetor Air
Hook, Clothes Hanger
Hub Caps, Wheel
Ignition Switch, Key-Operated
Ignition System, Dual Magneto
Indicator, Airspeed
Indicator, Stall Warning Audible
Instrument Panel, Shock-Mounted
Landing Gear, "Land-O-Matic"
Light, Dome
Light, Generator Indicator
Lighter, Cigarette
Lights, Instrument Panel Red Flood (Variable Intensity)
Lights, Navigation
Lock, Baggage Door
Lock, Cabin Door
Lock, Aileron and Elevator Controls
Map Compartment
Mufflers, Engine Exhaust (With Heat Exchangers)
Nose Gear, Steerable
Pockets, Map and Storage (Four)
Priming System, Engine
Propeller, Fixed Pitch (McCauley)
Regulator, Voltage (20-Amp., 12-Volt)
Rings, Airplane Tie-Down
Seat Springs, No-Sag
Seats, Adjustable (Front and Rear)
Shelf, Utility
Shielding, Engine Ignition
Space, Optional Instruments
Spinner, Bullet Styled Propeller
Starter, Engine (Mechanically Engaging)
Step, Cabin
Strainer, Fuel (With Cabin Quick Drain)
Straps, Assist
Tachometer, Recording (Mechanical)
Tires, Tubeless Nylon
Trim System, Elevator
Ventilators, Adjustable Cabin Air
Window, Hinged Left Side
Wiring, Landing Light Partial

ADDITIONAL EQUIPMENT STANDARD ONLY ON THE SKYHAWK

Altimeter, Sensitive
Clock, Electric
Detectors, Navigation Light
Fairings, Speed (Wheel)
Fairings, Speed (Wing Strut)
Flasher Unit, Navigation Lights
Gage, Outside Air Temperature
Gyros, Horizon and Directional Remanufactured (180-Day Warranty — Includes Vacuum System)
Indicator, Rate-of-Climb
Indicator, Turn and Bank
Interior, Appointments (Special)
Light, Landing (Dual Beam)
Paint Scheme, All-Over
Speaker, Cabin Radio
Starter, Engine (Push-Button All Electric) (Exchange)
Sun Visors
Tow Bar, Airplane

Standard equipment and specifications subject to change without notice

FREE VPM ANALYSIS — With the answers to six simple questions, your Cessna dealer can provide a Value Per Mile Analysis for your company. You can actually see **how little** it costs to travel farther and faster in your choice of 12 Cessna's for '61 and **how much** extra power, performance, and progress you can **expect and get.** Ask your Cessna Dealer for a free VPM Analysis, now. No obligation.

FINANCING — Your choice of 12 new Cessna's for '61 are as easy to **buy** as they are to fly!...for Cessna dealers offer a convenient, practical plan for financing . . . a program designed to provide fast, simple, pre-planned financing service. See your Cessna dealer for the details, and terms, of a financing plan which will put you out front, keep you out front — to stay . . . in a Cessna for '61. Lease plans are also available.

RENT-A-PLANE — If you want to test the profit-proven benefits of a Cessna before you buy . . . if you're looking for the link to make an important travel connection . . . or if you simply want to fly for fun . . . remember, you can rent a plane just like you rent a car! Fly yourself or with pilot provided. Call your Cessna dealer for complete details.

COOPERATIVE OWNERSHIP — If your individual needs do not presently justify sole ownership of the Cessna of your choice, ask your Cessna dealer about group ownership. He'll give you the full details of the popular associate plan for cooperative airplane ownership . . . a practical plan which permits small groups to pool their private air travel budgets in order to economically participate in the progress . . . and fun of flying a Cessna for '61!

LEARN TO FLY AS YOU TRAVEL — Your Cessna dealer has a flight training plan to fit your every-day schedule. Most popular is the "Learn-to-fly-as-you-travel" plan. You can actually take "on-the-job" flight training during business trips! Your Cessna dealer can also arrange an "after-five" and weekend schedule of training, too. And when you solo, your Cessna dealer will present you with a "Cessna Solo Trophy," a clever and handsome piece you'll be proud to put on permanent display in your trophy case, at home or in the office!

"GOLDEN RULE" WORLD-WIDE SALES AND SERVICE — Wherever you go you'll be only minutes away from the Cessna "Golden Rule" service. When you see the Cessna dealer's red and blue pennant shield of service . . . it's a sure sign that your service needs will be handled expertly, economically, and efficiently by factory-trained service technicians — and that you'll get prompt, courteous attention. Across the nation . . . around the world . . . look for the red and blue pennants, the sign of Cessna Golden Rule Service!

FLIGHT/SWEEP STYLED COLOR SELECTIONS

172

10: WINCHESTER GRAY / CLASSIC IVORY

20: COPPERTONE BROWN / STARGLO YELLOW

50: WINCHESTER GRAY / STARGLO YELLOW

40: RANGOON RED / CLASSIC IVORY

60: COPPERTONE BROWN / PEBBLESTONE BEIGE

30: NOCTURNAL GREEN / SPRING GREEN

SKYHAWK

1: WINCHESTER GRAY / CLASSIC IVORY

5: WINCHESTER GRAY / STARGLO YELLOW

2: SPRING GREEN / CLASSIC IVORY

3: CELESTIAL BLUE / PEBBLESTONE BEIGE

6: PEBBLESTONE BEIGE / COPPERTONE BROWN

4: CLASSIC IVORY / RANGOON RED

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HOW MUCH POWER, PE
CAN I EXPECT FROM

"How much?" Here's the answer in a quick capsule. Cessnability means Championship. Things like the velvet surge of pure power. Exclusive flight-ease features. The promise of uncommon elegance plus long-lasting, basic value. And that extra edge of all-around performance and prestige which looms like a chasm between the leader and the closest challenger. All things which have made the Cessna 172 the leader of the low-cost, four-place field . . . and it is also full size, high wing, and all metal for complete comfort, maximum stability, and lasting endurance! But there's even bigger news in '61. The 172 has an upper classmate. The Skyhawk. A distinctive, new, deluxe version **loaded with extra equipment** . . . equipment normally optional on other airplanes! Stepped-up styling inside and out . . . a prestige, value-packed stand-out in the low-cost class! Ready NOW to join the Cessna 172 — still the basic value leader. Now, **two leaders** to choose from in the low-cost, full-size class!

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M A SKYHAWK / 172?

And regardless of your choice, you'll get a thrill from the long, low graceful sweep from forward thrust to flight/sweep tail. And from the first introduction you'll feel a comfortable **rightness** at how easily the fashionable, flexible, and fast Skyhawk or 172 fits your travel plans. You'll thrill, too, with the realization that every future hour you enjoy aboard either the Skyhawk or the 172 will replace two or three hours you used to spend on other types of transportation. Your Cessna dealer will be happy to help you select the low-cost, full-size, high-wing leader best suited to your travel requirements. Call him today. Time's wasting. Why wait?

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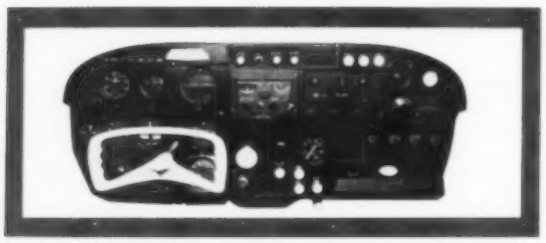
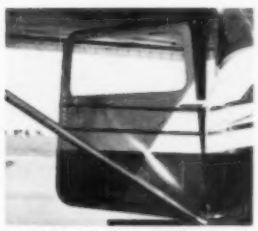
RELAX IN EXTRA CESSNA COMFORT



Handsome flight/sweep instrument panel groups instruments and controls within easy view, easy reach for eyes-on-the-road operations.



Yard-wide cabin doors provide easy access and entrance . . . open easily, close gently and snugly.

Individual reclining front seats equipped with removable head rests adjust to three reclining angles, six fore and aft positions for "tallest to smallest" occupants (optional).

No other airplane in the low-cost, full-size class can successfully compare its cabin with the careful composition of serviceable fabrics, subtle colors, and unique textures which keynote the Skyhawk/172 interiors for '61. It's the quietest . . . most restful combination of interior luxury . . . **plus** practical economy, that ever **zoomed** smoothly up, off, and away from an airport!

You'll have a difficult choice to make between the color keys for '61 interiors . . . the clear aquamarine of "Nocturne" . . . or the pleasant, warm and cool combination of "Cedar Frost." But remember, **whatever** your choice, you'll be fashionably correct! And both color keys are coordinated to precisely fit a galaxy of complementary colors, tones, and textures. You'll ride quietly, too, with fiberglass insulation and brush-applied sound deadeners to seal out the sound! Temperature and ventilation control is provided by Cessna's exclusive "Blend Temp" system of hot and cold air inlets. Fore and aft adjustability of pilot and co-pilot seats provide individual selection of just the right amount of leg room . . . for a "tall and a small" combination in the front seats, while each remains properly positioned to the control panel. And the two rear seat passengers can stretch out comfortably in the adjustable backed expansive rear seat. Easy entry and exit is assured by two, yard-wide doors and all seat backs tilt forward to permit wide clearance for rear passenger and baggage loading. Deeply "posture-padded" seating on stout tubular frames and no-sag spring construction provide the precise amount of "softness and strength." A "comfort-fitted" control wheel, outside baggage door, color-styled control knobs, dome lights, four ash trays, satin-finished door handles, and electric cigarette lighter . . . and an all-new instrument panel of handsome, functional design . . . all add up to this fact: You can't buy a better full-size, four-place, all-metal business airplane — with style to spare — for the low price of a Skyhawk or 172 for '61!

CEDAR FROST

HOW MUCH?

Feature by Feature — Take the measure of the exciting new Skyhawk/172 and you'll see how much more you can **expect and get** in '61! For instance, the 172 provides . . . **High-wing stability** for smooth, steady ease of flight control . . . and better visibility. **A new longer, lower look** — (three inches lower for superb ground handling). **New outside baggage door** for easy loading at departure point, easy unloading at destination. **New instrument panel** with functionally grouped instrumentation for "eyes-on-the-road" operation. **Continental O-300 D engine** for years of dependable, thrifty operation. **King-size cabin** for stretch-out, move-around freedom. **Flight/sweep interior styling** for smart, fashionably correct elegance. **Para-Lift flaps** for swift, sure lift and slow, easy descent. **Land-O-Matic gear** for safe, smooth, and simplified drive-up, drive-down take-offs and landings. And on the Skyhawk you'll find all these plus the following key feature standouts: **A new engine-driven vacuum pump. New all-electric push-button starter. A complete set of gyro and primary flight instruments. And your choice of six fully painted flight/sweep exterior color combinations** . . . these and dozens more features are all part of the world's two most unique travel packages . . . the only all-metal, full-size, low-cost, four-place business airplane with high-wing stability, available on the market today . . . the 172 — and its deluxe-equipped "upper classmate" — the distinctively styled, all-new Skyhawk! Both low in cost — first in features — highest in value! How much to buy and fly? Ask your Cessna dealer for a VPM (Value Per Mile) Analysis. Six simple questions will reveal the economic justification your company has for an airplane, how little it will cost, how much time, travel expense, and energy you can save. No obligation.

HAVE YOU READ?

By JAMES F. SUNDERMAN

ON WINGS OF FAITH, by Violeta Kokenes (Random House, 457 Madison Ave., New York 22, N. Y., $3.95).

In late 1957, Connie Kokenes, former AF flyer, his wife, Violeta (Tata), and their five-year-old son Tiko, packed a Beech Bonanza—the "Con-Tiki"—with a few personal possessions, survival gear, reams of aerial maps, and left Clearwater, Fla. on a bold aerial venture to circumnavigate South America. Some 123 flying hours and 19,000 miles later Connie slipped the "Con-Tiki" back into Clearwater airport—the first American family to accomplish the around-South America feat in a lightplane.

The book recounts the hours of preparation, the detail planning, and the step-by-step flight from Clearwater, Fla. to Chile. From there it was "needle north" via the coast to Panama and back to Clearwater.

The vivid details of the journey, the experiences at remote jungle airstrips, the tense moments of flight over strange and trackless country through unpredictable weather areas and along unfamiliar and unknown night courses, add realism and adventure.

A short time after their South American adventure and on a flight from Charlottesville, Va., to Clearwater, Fla., tragedy struck. It happened quickly. A runaway prop. A forced landing in a river. Violeta alone survived to extricate herself from the sinking Bonanza.

The ending is a story of the author's deep, unshakeable courage in setting out to create a new life for herself as boundless as the horizons she had shared in the sky with Connie and Tiko.

THE YEARS OF THE WARBIRDS: THE STORY OF THE MEN AND PLANES OF WORLD WAR II, by Arch Whitehouse (Doubleday & Co., 575 Madison Ave., New York 22, N. Y., $4.95).

This is a popular history of the WWII air war, written for the layman who is not particularly interested in a scholarly professional approach. There is enough of strategy and tactics, however, to pull the war into a coherent picture and relate mission sorties, air campaigns and battles to the over-all Allied strategy.

The book largely is made up of stories of fighter and bomber pilots, both Allied and Axis, and the aircraft they flew from 1939 to the collapse of Germany and Japan. It is studded with heroic feats of the top aces, such as Britain's Johnnie Johnson, America's Dick Bong and "Gabby" Gabreski; the Doolittles and the LeMays and the lesser known of the bomber war. Following a chronological pattern, Whitehouse switches from Europe to the Pacific and back as the air activity develops in intensity and impact.

The book is a pleasant way to learn air history but Whitehouse writes it as though WWII ends the role of manned aircraft in war. On this point many disagree with him.

THE LIFE AND DEATH OF THE LUFTWAFFE, by Werner Baumbach (Coward McCann, 210 Madison Ave., New York, 16, N.Y., $3.95).

Former Luftwaffe colonel, Werner Baumbach, finished WW II as General of the Bombers, a 30-year old flyer who began his air career as a glider pilot. In the early days of WW II he served as dive-bomber pilot in the battles of Scapa Flow, Firth of Forth, Narvik and Dunkirk. His brilliant combat record led to a meteoric rise to high position under Hitler and Goering.

Though his book is autobiographical, it traces the history of the Luftwaffe from its illegal beginnings after the Treaty of Versailles, its contribution in the Spanish civil war to victories in early WW II and the final defeat in 1945.

A close friend of the great German flyers Udet, Herman Goering, and men like Alfred Spear, Baumbach qualifies to discuss the internal troubles and political intrigue of the Nazi high command, the short-sighted planning, the failures of the "Blitzkrieg" concept, Goering's fall from power and many other factors which led to final defeat.

Baumbach's incisive look into the air war provides American readers important lessons.

THE HURRICANE STORY, by Paul Gallico (Doubleday, 575 Madison Ave., New York 22, N. Y., $3.95).

"There will never be a time when the story of the Battle of Britain . . . will not be told and retold," writes Paul Gallico in his biography of the famous single-seater Hawker "Hurricane" fighter which played a key role in this historic air battle.

The story begins in 1933 when Sydney Camm pushed forward with his design of this speedy fighter without encouragement from the British Air Ministry. By 1935, the prototype made its first flight and its test performance excelled anything then known to exist.

During a public demonstration at the 1939 Brussels air show, German and Italian observers were impressed by the Hurricane's performance.

Gallico recreates the full story in absorbing style and brevity, weaving in the personal air combat tales of heroism, courage, despair and victory.

Puritan Rides the Caravelle for United Airlines

Puritan's on-and-off valve, and first aid valve for passenger outlet stations have been specified by United Airlines for the oxygen breathing systems in their fleet of new Caravelle Jets, manufactured by Sud Aviation, Toulouse, France.

The Puritan valves enable passengers to be supplied with emergency oxygen if needed, and, during normal flights, with first aid oxygen for respiratory ailments.

Your inquiry on any problem concerning high altitude breathing systems and equipment would be welcome.

Puritan's valves are mounted in the back of seats facing passengers, and in the Caravelle's bulkheads in both the lavatories, and where there are no seats forward of the passenger station.

AEROSPACE DIVISION

Puritan

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Slam it on water!
Soar to the sky!
Land "hands off"!

THREE WAYS...

LAKE IS AMERICA'S "UNBELIEVABLE" PLANE

Pick up the challenge! Fly the new Lake 4-Place Amphibian— you'll believe what you thought couldn't be true!

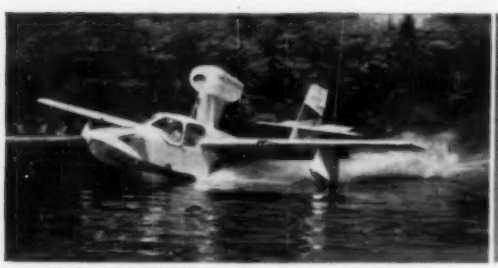
Let's face it. Anybody can tell you the good things he wants you to believe about his product. Only Lake offers you three *unbelievable* benefits which make acceptance of America's only single-engined amphibian one of the most talked-of events in business-aviation history.

Lake is built like a battleship. From true-boat hull to straight-through spar (and in a hundred other ways you can't see), Lake is built to take the punishment of rough water handling. But *it outperforms many land planes.*

Lake takes off on a dime. It climbs like a fighter. It glides like a glider. It really soars! Yet *it has heft and stability to shrug off water take-off, water landings, which no land plane ever has to take.*

Lake says: "Glad to have you at the controls!" Land "hands off" on water! Lake is one of the easiest planes to fly ever made. Check out with a factory-trained flight instructor and *you'll be at home on land and water in a Lake . . . in a week or less!*

Want to believe it? Fly it! Lake takes you more places on land *and* water, and safely brings you back again, than any land *or* water plane can do . . . to more than earn its keep for you. Write for complete description. Or phone or wire for name of your nearest Lake Dealer, *today!*



Lake is built like a battleship, to take the punishment of rough water landings

The agile Lake takes to the air as if it had its home up there

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YOU ASKED FOR IT...HERE IT IS!

THE NARCO ADF-29 AUTOMATIC DIRECTION FINDER

With Revolutionary New Narcomatic Sensor...
Discards Old-Fashioned, Static-Prone, Null-Seeking System...
Operates on Strongest Signal...All-Transistorized...
Draws Only Half an AMP...Weighs Only 8 Pounds...Available NOW!

"Why not a Narco ADF?" For years that question has been asked by the tens of thousands of private and professional pilots and plane owners who have learned to respect and trust Narco Omni and VHF communications equipment. Narco's answer has always been "Not until a new and better design concept for ADF's can be found." Now, after years of steady research, that time has arrived. Narco has an ADF—the incomparable ADF-29—developed and designed by the same Narco people who made safe, reliable, accurate Omni available at practical cost for the vast majority of private pilots and plane owners.

"Just another ADF" was not good enough in the minds of Narco engineers and management—a group made up mostly of seasoned pilots fully aware of the navigation ease offered by a needle that pointed to and brought you to any radio range or homer, marine beacon or standard broadcast station.

Narco's ADF development project was started five years ago with these basic concepts and design goals:

1. **There must be a way to derive direction information from the strongest station signal, not the weakest. Present-day (pre-Narco) ADF's get their information from nothing—that is, home on the null or minimum signal, easily get distracted by extraneous signals such as static and, especially, thunderstorms.**
2. **There must be a way to eliminate the rotating, null-seeking or gonio loop, kept at right angles to the station by costly, delicate, on-off electro-mechanical systems.**
3. **There must be a simpler way to translate direction sensing information to needle indication in front of the pilot.**
4. **There must be a way to substantially reduce weight and electrical power loads, both becoming critical problems in modern, well-equipped business airplanes.**

Narco proudly reports that every one of these major goals has been achieved beyond the most optimistic expectations. The result? The Narco ADF-29—so totally different in concept, so improved in performance, so simplified for better reliability, so compact that all previous ADF designs and concepts are obsolete

NARCOMATIC SENSOR

Heart of Narco's electronic breakthrough is the patented Narcomatic Sensor, which protrudes only 2½ inches from the aircraft's skin, and complements the clean aerodynamic lines of today's fine business airplanes.

Inside there are no moving parts, just three fixed sensing units which compare signal information 100 times a second. Most important, the Narcomatic Sensor derives its information from the strongest, sharpest, most clearly defined signal of the station tuned—not the null. As a result, the ADF-29 is much less affected by thunderstorms, static or other extraneous signals.

COMPACT, PANEL-MOUNTED, ALL-TRANSISTORIZED

The entire ADF-29 combination receiver and tuning unit mounts simply and easily on the panel in an instrument cut-out measuring 6⅜ by 2⅛ inches. Even the direction needle is incorporated in the face plate, eliminating the need for a separate indicator instrument and finding the space for it in the panel. And the indicator has been designed with an oil-submerged, hermetically-sealed meter movement for faster action, constantly precise bearing indication.

Here are other features you'll like about the Narco ADF-29:

Weighs Only Eight Pounds—about half the weight of other ADF's.

Draws Half an AMP—about one-twelfth the power normally used.

Has Manual Volume Control (plus AVC).

Provides For Correction of quadrantal error.

Price complete $895

narco ADF-29

See your Narco distributor or write for ADF-29 brochure,
National Aeronautical Corporation, Fort Washington, Pennsylvania

Man at the center

GILL ROBB WILSON
Publisher

EACH MONTH, for almost a decade now, when the time comes to devote myself to this page, I find my mind in conflict over matters on which to comment.

Out across the skies of the world every hour are thousands of pilot confreres cruising at their daily toil. Others are poised in their ready-rooms alert to the defense of the free world. Still others are patiently teaching the way of flight to an oncoming generation. In control towers, on maintenance lines, at radar scopes, over design boards and occupied with myriad details of investigation, research, analysis, toils a veritable army. I can see them all in my mind's eye.

Too, memory insistently intrudes—ships, comrades, storm, beauty, cloud, wind, sun, life, death, awe, wonder, exhilaration, despair, war, peace. Like surf on shore, wave after wave, it washes to demand articulation.

What is the long meaning of it all? What can I say that is worthy of the sweating hands, the intense minds, the stout hearts which have joined to expand the destiny of mankind? Patently, I must not sink to trivia or conversely orbit cloud nine.

What then? Whither the air age? Between the airman's probing to set mankind free in the universe and the ideological war of Communism to enslave mankind physically and mentally there seems such a gulf as to beggar definition.

To bridge this gulf, diplomacy has exhausted its historic techniques. Within it the religious creeds tug and contend in mounting confusion. On its perimeters the self-serving aspirations of government kick up a weary dust. On its approaches politicians vie for electoral favor with nothings of alternate pride and lament. Into its breach in the abused name of democracy rush segments of opportunist peoples to scavenge advantage they have not earned.

What then is the recourse of the more thoughtful but unorganized masses of mankind? What especially the recourse of the legions of us who have dreamed and toiled toward the stars? How can we serve to bring into universal contempt the reactionary concept of a police civilization? What fundamental of truth is available to us as a persuasive weapon?

In long ago university days I majored in comparative religions and in the history of philosophy, an area of study seemingly remote from the career of an airman. I was eagerly curious to understand the causes of human behavior, to learn what made men tick in the contrasting patterns of civilization.

All was interesting but only a few things seemed profound, and of these few things the profoundest thought of all was that the instinct of every race, color and creed since recorded history began placed man at the center of creation.

Herein seems to me might be the effective place to draw the line and to challenge humanity to take its stand on one side or the other—man as the center of creation or man as merely a biological accident, a reasoning brute. Here Christian and Jew, Taoist and Buddhist, Hindu and Mohammedan and all who have a faith of any kind can find common cause. Here is a line that does not change with shifting circumstance. Here is a line that requires no competitive surrender. Here is a line that destroys no fond traditions, disrupts no loved rituals, calls for no organizational changes. And above all, here is a line that by its very existence bankrupts the slave concept as tenable for human society.

Soon the Yuletide will be upon us. Christian hearts will be lifted for a glorious moment above the pressures which crowd our times. For a little we shall forego the business of getting and concentrate on the business of giving. In the midst of war we will be at peace. We will renew our spiritual heritage. And what Yuletide means to us some kindred time of spiritual emphasis means to the faithful of each other creed.

I have no religion to sell. I have no certain knowledge of the creative force men call God. I have not bumped the floor of heaven in the stratosphere. I have only an unshakeable instinct that I am more than a steer, a bear, a dog. In trouble prayer rushes unbidden in artesian flow from my heart. I find peace in worship. I find order in the universe.

It seems to me that the air age must be prelude to man migratory in the universe—must grow and grow and grow until his stature fills all things. If this is to come true, it will come because man is at the center of creation and is fulfilling his destiny, rather than because he is a slave with a biological ceiling.

DEAR AMERICAN AIRLINES:

AS A MECHANICAL ENGINEER, I MUST SAY THAT YOUR 707 JET IS A MASTERPIECE OF DESIGN, COMBINING SPEED, POWER AND SIMPLICITY FOR MAXIMUM COMFORT. MY COMPLIMENTS TO YOU.

PAUL J. McCARTHY

UNSOLICITED IN-FLIGHT LETTER FROM MR. P. J. McCARTHY, GREAT NECK, N. Y.

Our 707 Jet Flagships, Mr. McCarthy, are another reason why American Airlines is first choice of experienced travelers. To date, American's 707's have carried more than 2,000,000 passengers—far more than have flown on any other jetliner. The 707 is the most experienced, most proven jet airliner flying anywhere today.

AMERICAN AIRLINES
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NEW AIDS FOR GENERAL AVIATION...

New pilot aids that range all the way from VFR approach guides to pictorial navigation displays are evaluated by the FAA's National Aviation Facilities Experimental Center. Here is the second part of a report on current developments.

By MYRON B. GUBITZ

BECAUSE LANDING is the most critical part of any flight, authorities have long felt that there is a definite need for some kind of visual guide that pilots can use on the approach to a VFR landing.

For the past year or so, evaluation tests have been run at NAFEC on a number of systems designed to fill the need for such a visual glide-path indicator (VGPI). At first, tests were run on five individual systems, designed respectively by the Navy, Air Force, Westinghouse, Cumming-Lane (Australian) and the Royal Aircraft Establishment (British). The Navy, USAF and Westinghouse systems were eliminated, however, and for the past few months the Cumming-Lane and RAE systems have been carefully compared.

The object was to select one system, to be recommended as the U. S. standard VGPI.

The tests were run with a large number of pilots from all segments of aviation, flying 26 types of aircraft ranging from a Tri-Pacer to a Boeing 707. Flights were made in daylight and darkness, and in excellent, fair and poor visibility.

Pilot reactions and opinions were carefully noted, and precise information was gathered by research instruments and tabulated by a computer.

A few months ago, the tests were completed and NAFEC's final report submitted to FAA headquarters. Recently, Administrator E. R. Quesada approved the report, accepting the RAE system as the U. S. standard.

What this means is that from now on there will be available at airports which care to install it a visual guidance system to be used by pilots during VFR landing approaches.

Essentially, the VGPI gives an incoming pilot the same information provided by ILS, but without the need of special cockpit instrumentation.

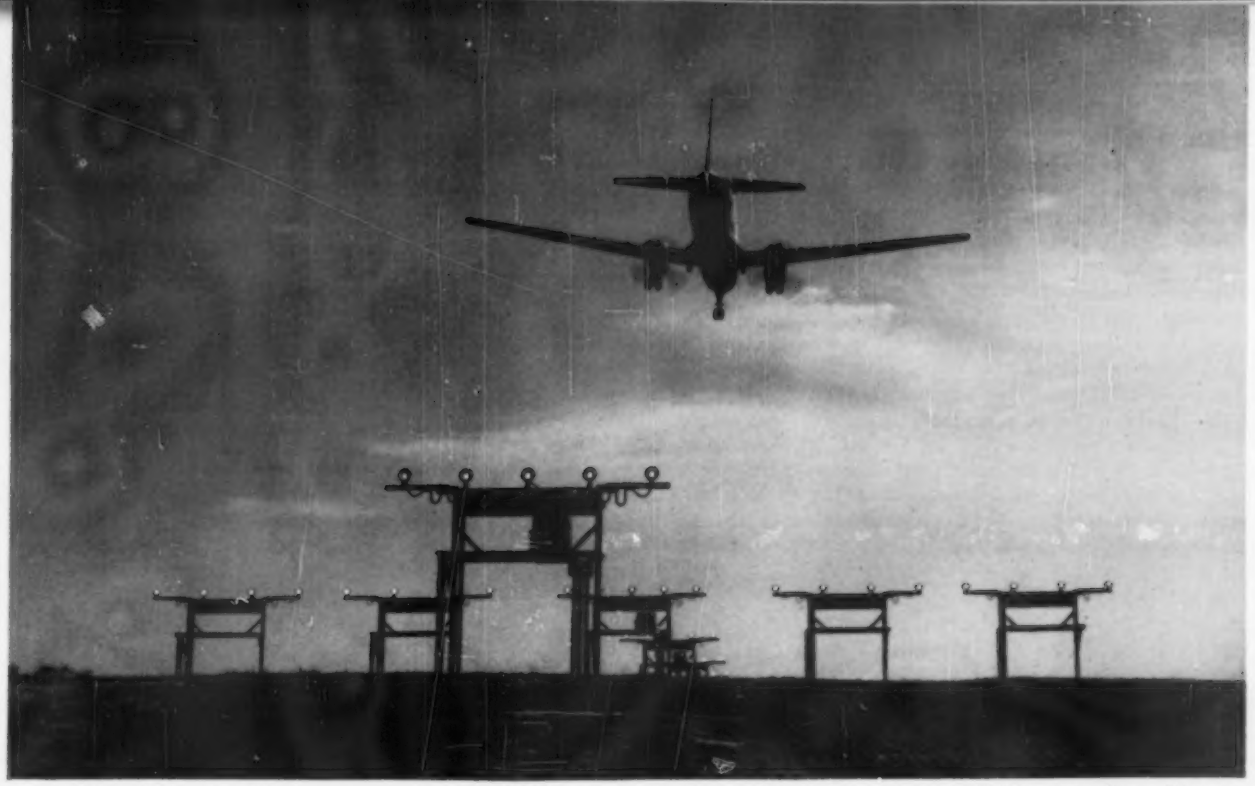
The VGPI isn't a substitute for ILS, PAR or any other poor-weather landing aid. It is, rather, a device designed to assist any pilot in any aircraft to maintain a good glide slope during a VFR approach. Its benefits are many: It helps avoid low or high approaches; aids in the noise-abatement programs; helps prevent go-arounds; provides information for airports in rough terrain and on uninstrumented runways, and acts as a constantly available training device for all pilots.

Here's how it works: The full RAE system, as tested at NAFEC, consists of 12 light-boxes. Three boxes are placed on each side of the runway at the 750-foot mark and three on each side of the runway at the 1,250-foot mark. Inside each box are three sealed-beam lamps, with upper sections colored red and lower sections of clear glass.

Viewed from a high angle, the light coming from the boxes looks white. When viewed from a low angle, the light appears red.

By adjusting the tilt of the light-boxes along the runway, they can be arranged to define a safe glide-path corridor to the on-coming pilot. When the pilot is within that corridor, he sees white light coming from the nearest boxes, and red light from the boxes farther up the runway. If he sees all red, it means he is too low on the approach; all white indicates he is too high. Only the red-white combination means that he is on a proper glide path.

During NAFEC tests, pilots picked up positive guidance from the RAE system from as far out as five miles,



Above: A Convair C-131 passes over a new approach configuration designed to provide an inexpensive runway lighting system for small airports.

Below: Fog generators lay a dense cover over the runway to check the penetration qualities of a new pattern of lights set in the concrete.

and continued to receive guidance until they were just 750 feet from touch-down.

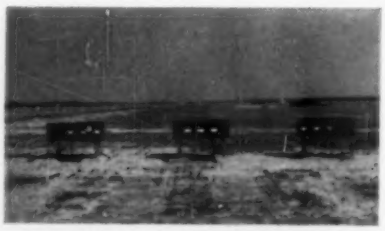
Hardware for the full setup costs about $5,700, including the sealed-beam lamps and red filters. Installation costs vary anywhere from $8,000 to $20,000, depending on the terrain, location of the power source and other factors.

But the system is flexible. For small, fixed-base operations that can't afford such a large investment, the system can be pared down to only two light boxes, instead of the full complement of 12. Guidance then is reduced to only about a mile out from the runway, but that's ample for most smaller aircraft. The cost of such a small-field installation would be around $2,000.

Final selection of a VGPI by NAFEC represents the first major project to be completed at the relatively new facility. It is thus a double landmark: a first for NAFEC, and a new and inexpensive tool being made available to all segments of aviation for easier, safer VFR landings.

If all the switches were thrown at once, Runway 13 at NAFEC would probably be the brightest, most confusingly lighted runway in the world. This is because a great variety of alternative lighting systems—approach, runway and taxiway lights—have been installed for test and evaluation purposes.

The program is an extensive one, designed to utilize the latest techniques and equipment to find the most effective lighting configurations for all types of runways. Fluorescent edge-lighting, Elfaca lights (now in use at Idlewild), MC-2s (planned for use at the new Dulles International) and a variety of inexpensive "pancake" lights are set out in a number of patterns and combinations. Test flights are being made under all weather conditions to determine their effectiveness.



Top: RAE system "light boxes" at each side of runway guide pilots on VFR approaches.

Right: Pilot holds on his lap an FAA-designed pictorial navigation display being evaluated.

NAFEC engineers test fluorescent edge-lighting, *above*, and incandescent edge-lights, *below*, with different patterns of guide lights. Center-line and high-speed turn-off lights also are displayed.

Two new projects, recently assigned to NAFEC by the FAA's Bureau of Research and Development, are particularly relevant to the requirements of general aviation. One is known as the "Poor Man's Approach System," and the other as the "Cross-bar, Cross-pip Runway System."

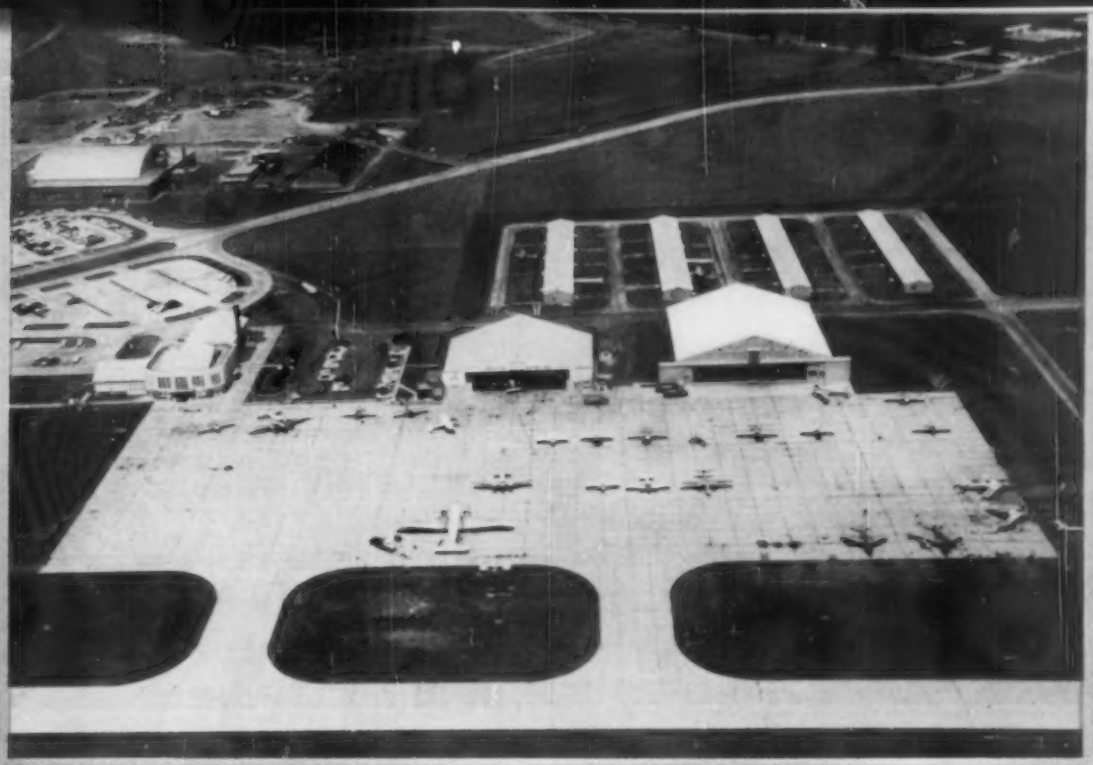
Most conventional approach lighting systems at large air terminals cost in the neighborhood of $200,000 each (that is, for each end of each runway equipped with approach lights). The so-called "Poor Man's System" is an effort to work out a configuration that can be installed at smaller fields for as little as $22,500.

It is actually a simplification of the standard approach system, whittled down from 3,000 feet in length from the runway threshold to only 1,500 feet. It uses no strobe lights (flashers). The fixtures are bars of conventional, 100-watt screw-in type spotlights, of the type that can be purchased in a hardware store.

The approval of such an approach-lighting system by the FAA will mean that many small fields, unable to afford the outlay required for a conventional system, will soon be able to offer this valuable landing aid to user-aircraft.

The "Cross-bar, Cross-pip" project is similar. It is an attempt to develop a good runway-lighting system which relatively small airports can afford. Instead of using the highly expensive Elfaca lights, or the somewhat cheaper MC-2s, this system has an entire runway lighted with rows and cross-bars of inexpensive, easily installed pancake lighting fixtures. Rather than a total cost of about $250,000 per runway (which is a low-average figure for large airports), the "Cross-bar" system should cost about $30,000 per runway. It has the advantage of flush-mounted pancake lights instead of the pedestal-mounted lights now in use at many small terminals.

The low-cost pancake lights also are being investigated as possible sources of lighting for runway center-lines and high-speed taxiway-turnoffs. Now used to light Runway 13's center-line, the pancakes are spaced about 20 feet apart. But NAFEC engineers are evaluating a turnoff (*Continued on page* 62)



Although business and private flying justifies airports such as this one, allocations so far have favored the major air terminals.

New public-aid policy on airfields for general aviation is now an urgent need.

More ports for business flying

ALTHOUGH the number of U. S. airports is on the upturn, the flying future of many areas will depend on public aid in the years just ahead.

The expiring federal program—the Federal Airport Act expires June 30—requires action from the new Congress if more money is to flow. Major air terminals have been favored in past allocations. The policy toward aid for business flying, apart from whether airlines benefit or not, is far from clear.

The aviation associations most concerned are making a quick review of the situation to set goals and pursue them. What are the facts? What can *you* do?

To start with good news, a net gain of 500 airports open to general aviation has been recorded in the past two years. From 6,500 in the early 1950s, the total fell to 5,300 in 1958; now is over 5,800. This was achieved despite the overrunning of more and more land by the booming cities, and in the face of higher land costs everywhere.

In part, it is the natural result of the maturing of general aviation as a sound local business. But it took a lot of doing.

Foresighted action still is urgent in many areas if land is to be had before it is too late. The gain in the number of airports open to general aviation is by no means uniform in all regions. Many of the new fields are small strips in rural areas while more important points for air travel still remain without adequate facilities.

Broadly speaking, there are four general situations to be met across the country, depending on population and traffic density.

1. *Hubs:* Around the 23 "large hub" cities, and others where congestion may be anticipated, most of the general aviation must be on fields other than airline terminals. Before all the close-in land is built upon, action at these points is urgent indeed.

2. *Joint Civil Use:* For the other 600 communities certified for scheduled airline service, much of the general aviation is from the same fields used by the airliners.

3. *Off-airline:* Where no airline service is certificated, fields must be maintained for general aviation only; some may later become airline stops.

4. *Rural:* Outside the cities, towns, and suburbs, many little airfields and flight strips are bringing all areas of the country within reach of aircraft.

Obvious as this may seem, officials have not brought the problem into sharp focus. Those interviewed for this report did not even know whether the U. S. total of landing places was increasing or decreasing, until a count was made for us.

Since the statistical classes have changed twice in the past few years and several (*Continued on page* 78)

CIVIC LEADERS ACHIEVE NEW GOALS FOR A WARTIME AVIATION CENTER.

An unrestricted view is provided from the eight-story-high control tower.

MIDWEST HUB FOR BUSINESS AND PRIVATE FLYING

WICHITA AIRPORT

By LOU DAVIS

A restaurant, shops and even a nursery are in the air-conditioned terminal.

MANY A PRIVATE pilot and business plane air crew flying over the windswept plains of the central states have wished for something special in airfields: one free of airline traffic congestion and affording air-conditioned comfort for the pilot, crew and passengers while the airplane is readied for the next flight.

One candidate for this pilots' dream is the Wichita Municipal Airport.

Although many fine airports exist in the midwest, few match its comfort and convenience. Crowded traffic patterns and limited facilities—at least for the private and business aircraft—usually mark the other major airports. Also, some are not as centrally located as Wichita in this region, or fall short of Wichita's unique qualifications for handling such aircraft, or for accommodating their pilots and air crews.

Wichita—south of Junction City, Kan., the geographical center of the United States, will be remembered by many ex-military pilots as the site of Boeing's bomber plant. B-29s were built there during the war. Beech and Cessna, too, were active there during the war years. Oldtimers remember Wichita as the "Air Capitol" of the nation. The Swallow, Cessna, Stearman and Travel Air—the predecessor to Beech—

The airport has a 7,300-foot instrument runway with high-intensity approach lights and high-speed turnoffs. A second runway is 6,300 feet long.

made Wichita a lively aircraft manufacturing center during the twenties.

When the air armament cutback of 1946 affected the bomber plant, the old municipal field became a true haven of the flying farmer and the business flyer. A key stop-over for short-haul flights, it became a center for business aircraft owners shopping for a new plane. Cessna and Beech—two of the nation's largest builders of small aircraft—were beginning to concentrate on their civil aircraft.

Since the community and its officials and industry were aggressively airminded, it was natural that ideas blossomed for a new and better airport. It was an opportunity once again to make the city of Wichita the air capitol of the nation.

The project was hastened by the resurgence of Boeing Wichita. The growth of the B-47 and B-52 families of nuclear jet bombers soon occupied all plant facilities, compelling full use of the old airport. With Boeing, commercial, and non-scheduled operations crowded together, the situation reached the point where the U. S. Air Force decided to buy the airport.

So, in 1949, the city fathers decided to build a new airport that would provide adequate service to airmen and win new prestige for the city. By surveys and horse sense, they decided to locate the airfield on the table-top area to the west of town—Air Force jet operations would dominate all the traffic airspace to the east of the city.

Today, Wichita's airport traffic pattern has one of the lowest density levels of any controlled airport in the country—testimony to both the airport's convenience and potential. Maintenance and servicing shops are air-conditioned and equipped for the most efficient service on almost any type of aircraft—large or small, single or multi-engined.

Management has concentrated its efforts on serving the private pilot—the flying farmer in particular. While his plane is being gassed or serviced, the spacious air-conditioned restaurant and lounge of the main terminal building make the en route stop a real treat for the pilot, and a shopping lure for his wife.

Modern, comfortable motels are a short taxi ride away on the perimeter of the field. The business district is but 20 minutes by rented car or taxi.

During a recent visit by FLYING, every nook and cranny of the field's installations were inspected. The port was a welcome relief from ones that have expanded beyond capacity. There are no sagging hangars or hot, dusty work shops; no aircrew and passenger lounges are sandwiched between water fountains and file cabinets. And there are no jammed airline terminal lounges with too few seats.

Visits to fixed-base operators disclosed bright and pleasantly decorated airplane (*Continued on page* 92)

Prototype 204B. Production models will be fitted with 1,100 hp Lycoming T53-L-9. Top speed of passenger configuration is 147 mph; range 260 mi.

BELL'S TURBINE-POWERED 204B

New commercial helicopter is a derivative of the rugged military Iroquois.

By A. C. BASS

BELL HELICOPTER'S new commercial rotorcraft—the 10-place Model 204B—is a rugged derivative of the military HU-1 Iroquois, the first turbine-powered, all-weather Army production helicopter which claims seven new world records.

Stability and handling ease—close to that of medium-size fixed-wing aircraft—was evident to FLYING's pilot-editor, who first evaluated the single-rotor 204B prototype as it made its public debut prior to an introductory tour of the United States and Canada.

Records set by the military version include speed—158.05 mph.; nonstop distance—441.74 statute miles; and time to climb to altitude—3,053 feet per minute (see box).

Powerplant for the commercial version will be the 1,100-hp Lycoming T53-L-9 free-wheeling turbine which generates a 2,660 feet-per-minute rate of climb and a top speed of 147 mph. Hovering ceiling (in ground effect) is 17,600 ft. The engine fitted to the prototype-demonstrator, however, was the 860-shp Lycoming T53-L-1.

The T53, specially designed for helicopter use, will run 1,000 hours between major overhauls. For ease of pilot handling the 204B also incorporates hydraulic power boosts (into the collective) and artificial "feel" for the cyclic and tail rotor controls.

Cost of the 204B will approximate $285,000. The rotorcraft is yet to be certificated, and will be available in the U. S. in late 1961. It will be produced at the Fort Worth, Tex., plant of Bell Helicopter Co., a division of Bell Aerospace Corp.

A licensing agreement has been made with Costruzioni Aeronautiche Giovanni Agusta, of Milan, Italy, for production of a similar type helicopter for the European market. Another agreement is in the works with Mitsui Bussan Kaisha, Ltd. (Tokyo) for the Asian market.

Commercial uses of the 204B include business and corporate transportation, airline feeder service, charter, offshore oil drilling and production support, etc.

The 204B was evaluated by FLYING at the Lockheed

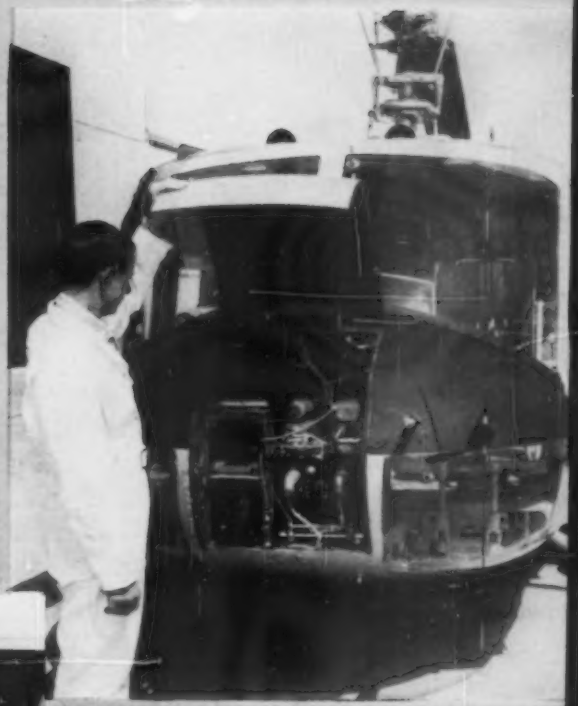
Air Terminal, Burbank, Calif. Aboard were seven passengers plus Elton J. Smith, Bell's chief experimental test pilot. Weight, including 125 gallons of fuel, was approximately 6,500 pounds—the maximum for the passenger configuration.

Following a thorough preflight briefing by Smith and a walk-around inspection, during which the main rotor, engine compartment and tail rotor assembly were checked, we were ready to go.

The 204B starting sequence is fully automatic and within 50 seconds after engagement the rotorcraft was ready for flight. At takeoff outside air temperature was 21 degrees C. The field elevation was 775 feet; wind, from the northwest, at eight mph.

After picking up translational lift at 15 mph a climb-out was continued to 4,000 feet at a rate of 2,160 feet per minute. Noise level and vibration while using takeoff and climb power settings was low and considered extremely good for rotorcraft.

Since the governor located on the collective for rpm increase and decrease both leans and regulates rpm

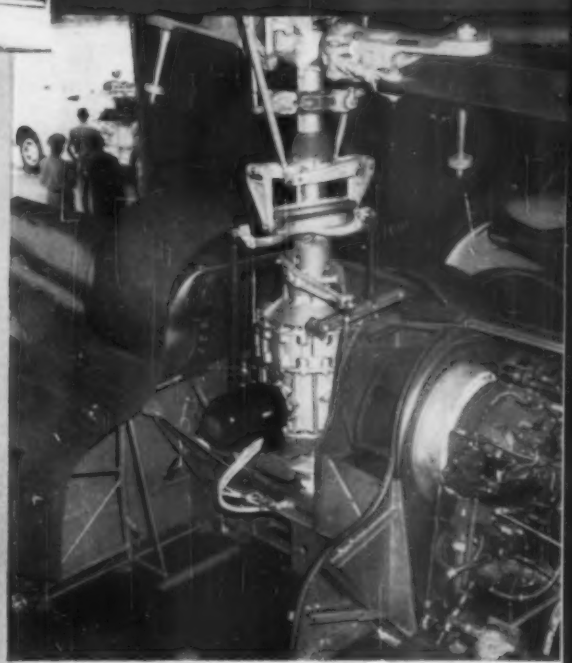


automatically, leveling off for cruise attitude required only a lowering of the collective.

Cruise, and turns in cruise at 110 mph, pointed up the fixed-wing handling characteristics of the 204B. Stability has been increased by the installation of a stabilizer bar that prevents the rotor from immediately following the inclination of the mast. This cuts down the number of small corrections that ordinarily have to be made throughout the course of flight. In conjunction with the stabilizer bar, dampers which aid in control response, and the hydraulic boosts enable "hands-off" flight once a desired attitude is set up.

In the event of a hydraulic system malfunction irreversible valves, installed on the hydraulic power cylinders of the cyclic and collective, prevent rotor feedback. Flying without the boosts is uncomfortable but nevertheless manageable.

Our speed run began at 5,000 feet, where maximum power of 96 per cent was (*Continued on page* 85)



THE AIRMAN'S WORLD

Where the mountains reach up with cupping hands to trap the snows against the sometime need of the thirsting valleys, the airman swings in soaring circles to peer back down the corridors of a million years upon the primordial architecture of earth's design.

From such outlook a pilot may ponder with what thermal skills worked the smithy of creation who tempered the planet to gallop with the galaxies; and with what artistry he forged such a geological symmetry as would be in good time the cradle of the race of man.

What patience was here that toiled in countless millenniums to carve a single crevassed face or set a ledge to guide a watershed or form a chute down which the glacial ice might creep, and creeping scaut a pass by which the unborn race might cross the templed hills.

And if when lifted up upon the wing to consort with the sun and wind and sculptured crag, the pilot's mind turns not to meditate the authorship of all beneath his gaze, then he has failed the privilege of his lifting up, which is to fill his heart with ecstasy.

GILL ROBB WILSON

CHECK PILOT REPORT

LAKE LA-4 AMPHIBIAN

A rugged and agile aircraft geared to operate from land, water and snow.

The author, a graduate of USAF's amphibian school, is ATR rated with sea privileges.

By GERALD J. SCHLAEGER

AMERICA'S only single-engined amphibian, the rugged four-place Lake LA-4, is as much at home on land as in water. The all-metal aircraft—gross weight is 2,400 lbs.—is tailored to the capabilities of the non-professional pilot. The pro—for example, the bush pilot—can work wonders with this versatile and agile business and personal airplane.

The LA-4, evaluated by FLYING and flown from both runway and lake, can get off a short strip in less than 600 feet. It can land and complete a 180-degree turn in about 400 feet. It can be brought into waves "hands off," be jockeyed about like a boat, and make a circular 600-foot takeoff, giving it "pond" capabilities.

The amphibian will soon be available with hydraulic, retractable Federal skis, giving it additional capabilities for ice and snow; thus it becomes a utility aircraft adaptable for all areas covering all seasons.

Power is supplied by a four-cylinder Lycoming 0-360A1A rated at 180 hp at 2,700 rpm. Propeller is a forged dural Hartzell constant-speed of 72-inch diameter. Governor is Woodward; pitch range is 13 degrees for low to 28 degrees for high at the 30-inch station.

Basic price of the LA-4 is $24,995. At this writing the 12th aircraft was rolling off Lake's production line at Sanford, Me. Of those produced thus far, three have gone to the government of Thailand for border patrol,

one to a Puerto Rican construction firm, the others to domestic purchasers. Lake expects half its sales to be foreign; forecasts three-a-week production by mid-1961.

The LA-4, a new amphibian, is an outgrowth of the earlier Skimmer C-2. Lake, which acquired Skimmer assets in October, 1959, started engineering work on the new LA-4 in December of that year. Its assembly line started production in March of this year.

By comparison to the C-2, the LA-4 is faster (and at a higher gross weight) with a cruise speed of 131 mph. Stall speed has been reduced two mph to 50 mph and range has been increased to 627 miles. Wing loading is reduced, wing span increased four feet and length increased one foot and five inches.

The hydraulic system was completely redesigned and a new V-bow added. The design changes have reduced takeoff distance to 1,125 feet (water) and 650 feet (land). Both of these distances easily were bettered.

Demonstrator flown was the sixth production airplane, N1006L, painted an attractive red and white with black trim. Lake president, Jack Strayer, an excellent pilot, was along with us as were Bill Newham, a new Lake dealer from Easton, Md., and USAF Major Bob Lamison.

The initial test was made under maximum gross weight—2,400 lbs. At takeoff, wind was from the northwest at 15 knots; sea level pressure was 30.07 inches and ground temperature was in the high 50s (F).

The cabin is entered through the split-door windshield which is hinged at the center to provide entrance from either side. A small step outside the hull affords easy entrance. The cabin is quite comfortable; floor to ceiling height is 43 inches in front, 47 inches in the rear. Width is 44.5 inches, and the length is 62.5 inches. The baggage compartment is behind the rear seat and extends well back into the hull. It is placarded at 200 lbs.

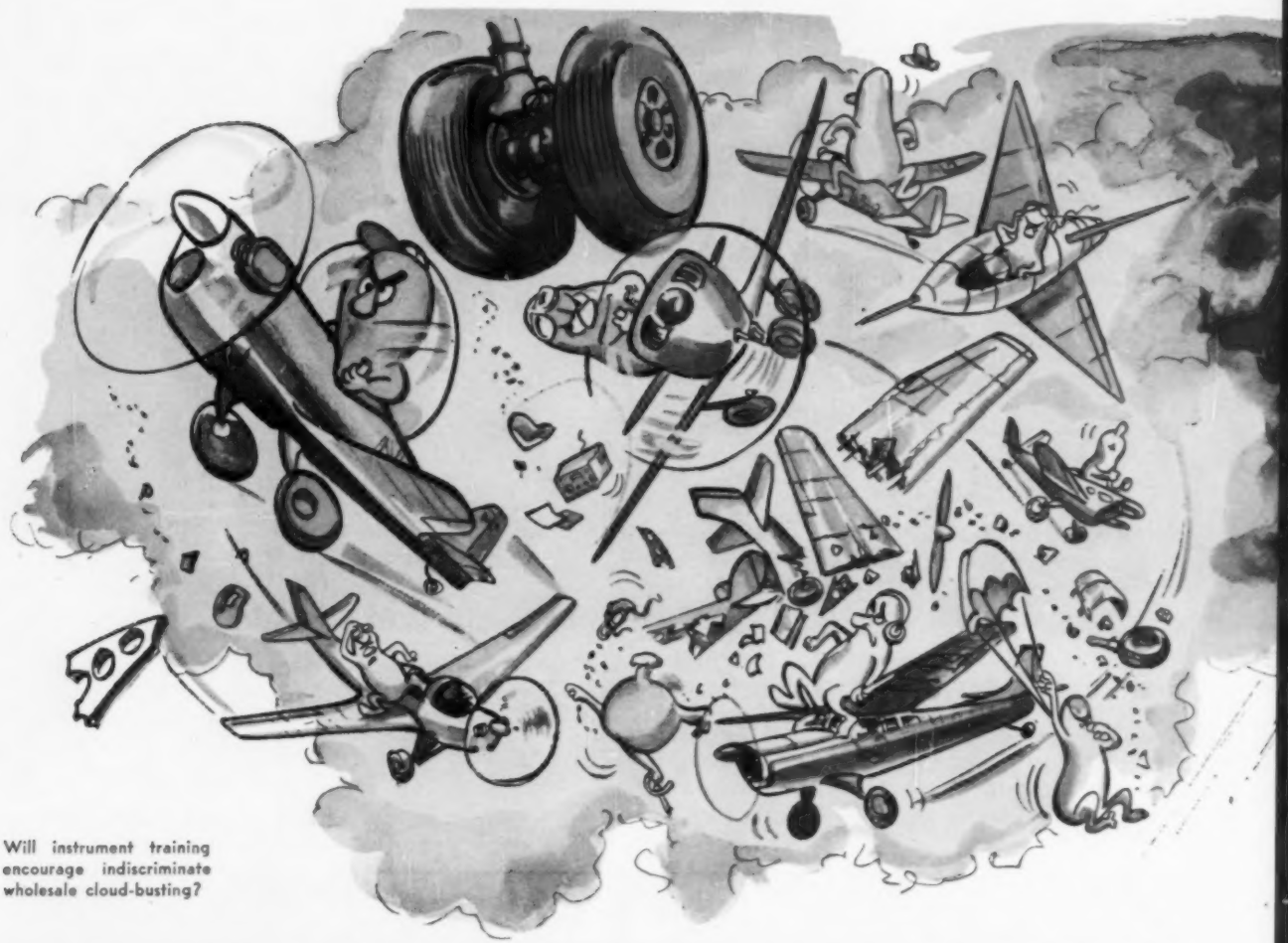
Pilots' seats are individually adjustable. Rudder pedals are non-adjustable but the copilot's pedals fold flush with the floor when not in use. Throttle, mixture, propeller and carburetor heat controls are suspended from the ceiling, thus reducing the linkage to the above-mounted engine. This arrangement becomes quite comfortable in a short time and soon makes the conventionally located controls in other aircraft seem out of place.

Above: Pull-up in short-field takeoff after run of 250 feet. *Below:* The LA-4 has a span of 38 feet, wing area of 170 sq. ft.

At dock, amphibian is boarded via walk-way extending over its nose.

On one panel—an unusual and extremely helpful feature—are electrical switches combined with circuit breakers, located on a sub-panel above the pilot's knees. Push-button starter switch is at the extreme left; ventilation fan, hydraulic motor and booster pump, too, are circuit breakers. Key ignition switch is centered in the main panel.

The engine started easily in the idle cut-off position after pumping the throttle several times and bringing the mixture to full rich as the engine fired. Little warmup was required and mag drop was negligible at the 1,800 rpm check. The cabin is well insulated with quron, a plastic padding, but the engine nevertheless made its presence known. Conversation (*Continued on page* 98)

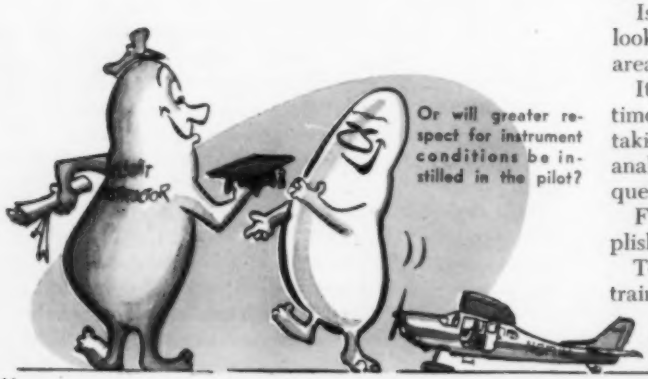


Will instrument training encourage indiscriminate wholesale cloud-busting?

NEW INTEGRATED INSTRUMENT TRAINING PROGRAM

By G. COURTNEY CHAPMAN

G. Courtney Chapman is chief flight instructor at Ohio State University. He conducted experiments in integrated instrument training there this year.



Or will greater respect for instrument conditions be instilled in the pilot?

FAA REGULATION CAR 20-12 requiring instrument instruction for private pilots is causing considerable apprehension among people in aviation concerned with training. Some of the criticism has been so sharp that questions naturally arise.

Is the integrated instrument program really bad or even dangerous, or are the fears voiced because of resistance to change? Could this reaction be aimed at the administration that enacted it?

Is it possible we could excite a different reaction if we looked at facts established by work already done in this area of integrated instrument training? I think so.

It is time we get away from emotional responses. It is time to identify our fears and look at facts. Instead of taking pot shots at something we haven't tried, let us analyze the goal. In light of facts, let us answer the questions that face every conscientious flight instructor.

First we will identify what we are *not* trying to accomplish in the integrated instrument training program.

Too many people seem to be confusing this instrument training with the training given to a rated pilot in prepa-

Both flight instructors and pilots should read this analytical report based on a three-school test study.

FACTS AND FALLACIES

ration for an instrument *rating*. Nothing could be farther from the truth. We are *not* trying to make the private pilot an instrument-*rated* pilot. The intent is to give the student something less complicated and more basic, yet something that may save his life. During integrated instrument program training there is no attempt to make the private pilot proficient in copying clearances or in having command of the elaborate instrument en route procedures or in understanding the intricacies of an instrument let-down and approach.

We are trying to teach the student procedures which will enable him to recover from an emergency situation. This is done for the same reasons that, early in his training, the student is taught stalls, recovery from bad landings and loss of engine procedures. We are teaching him to maintain control of the aircraft in critical situations and in emergencies when all references outside of the cockpit are obscured. We are teaching manual control of the aircraft when all ground references disappear. We teach him to use references within the cockpit.

Under the integrated instrument training program, the student is expected to have some reasonable degree of command of the aircraft and to be able to recover from various attitudes to straight and level flight, to point the aircraft in one general direction, change altitude, and turn to another general direction. The instrument training is strictly for emergency use only.

Let's establish a definition of what we are teaching during the instrument training in the integrated program. We are teaching manual, physical control of the aircraft with no attitude references outside the cockpit. We are teaching control of the aircraft's attitude by reference to the instruments. Therefore, we define the instrument training for the private pilot as: Instrument Reference Attitude Control (IRAC).

Once we have established what we are trying to accomplish, the next question is: Can this goal be reached successfully? In answer, let's look at the six specific questions heard most frequently.

The first two questions are closely related: Will it require excessive additional time to train the students? Even after they receive the training, will students be able to maintain adequate control of the aircraft?

Let's look at some facts and make some comparisons. In 1955 the University of Illinois and, in 1957 West Virginia University conducted experiments in simultaneous contact instrument flight training. In June, 1960 Ohio State University completed instruction of its first group of students under the integrated instrument training program as outlined by the Federal Aviation Agency. Results obtained are most interesting, and are reflected in the tables on page 96.

The programs at these three schools are similar in certain respects. All students in the programs were screened so that only persons who had never flown previously were used. The syllabuses used at all schools were modifications of the regular private pilot training course. The course had to be completed during the time allotted to the regular academic period (16 weeks at Illinois and West Virginia, and 11 weeks at Ohio State) while the students carried a regular academic load. All aircraft used had gyro horizons.

The basic difference in the courses was that Illinois utilized the Link instrument trainer while West Virginia and Ohio State did not. In all cases the first simulated instrument time given to the student was during the first 90 minutes of flight time. Simulated instruments were practiced at regular intervals thereafter. Students would practice a maneuver visually and then on instruments.

The results obtained should be revealing and certainly encouraging, to all flight instructors. There are three significant observations to be made:

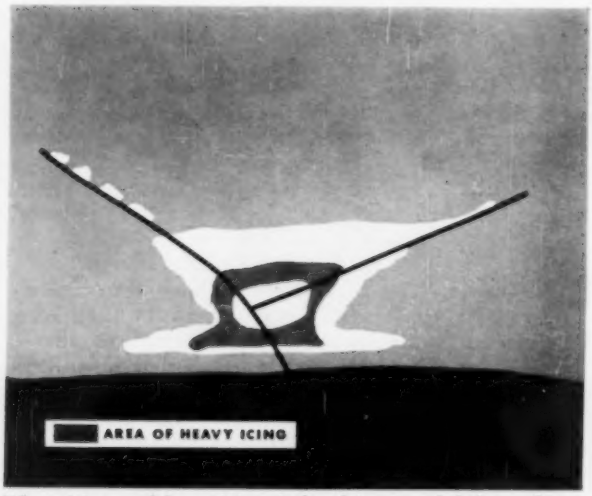
1. Of 39 students under the integrated program, 38 received private pilot certificates.
2. Highest average total flight time for any of the schools was 48:08 hours. This is well below the national average for private pilots.

(*Continued on page 95*)

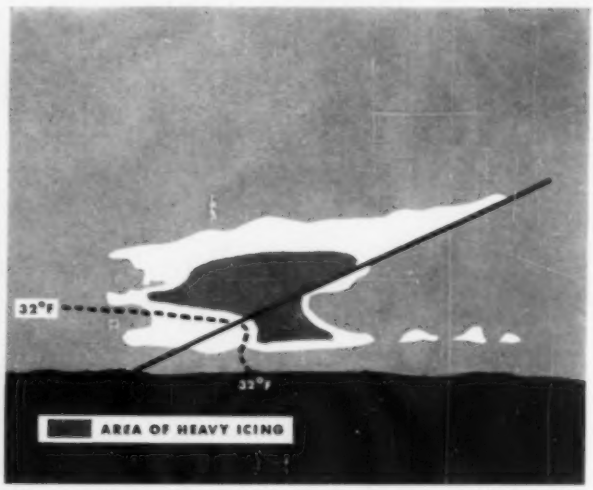
THE PRO'S NEST

What you should know about ICE

By JACK LE BARRON



Where icing—and heavy icing—is found in an occluded-type front.



The warm front can be extensive, producing prolonged heavy icing.

A comprehensive report of value to both the experienced pilot and the novice.

TREACHERY IS THE WORD for ice! Thunderstorms are violent. Fog is sly. But ice is a sinister quick-change artist that plays upon many stages —a master of suspense and surprise.

To be familiar with icing on a text-book basis is not really to know it. Ice is a psychologist that subtly piles on the pressure until the ordinary pilot, with ordinary skills and equipment, and in a jam, is sorely tempted to push the panic button.

Ice, the potential killer, for most pilots is the wanted poster face on the post-office wall. Who really expects to meet the killer? To be specific, just how much of a menace is ice? Should you concern yourself with icing as a subject?

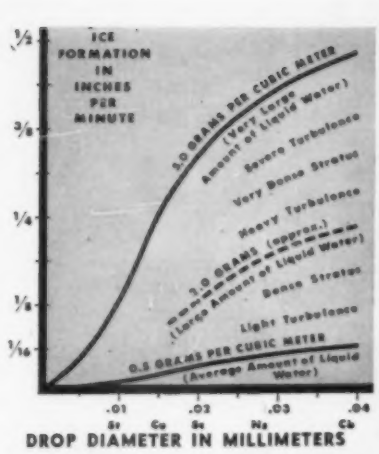
It is true that structural ice—the kind that builds up on wings, tails and antennae—figures in only approximately two per cent of the accidents to aircraft of less that 12,500 pounds. In 1955, for example, out of 2,983 such accidents, 40 involved carburetor icing, only six wing icing (1.8 per cent all told). But the percentage is inching up.

More planes are being flown more hours by more instrument pilots than ever before. This means more exposure to ice. Where the fair weather Cubs, et al, once were the backbone of private flying, today the number of business, corporate and utility aircraft of all descriptions is increasing by leaps and bounds.

A high volume of this flying is done in aircraft lacking full protection from icing. It is smart thinking to know more about this treacherous foe.

Natural laws govern icing. The first—however unlikely it sounds—is that water can remain in liquid form below freezing and the tiny particles which make up a cloud are nothing but liquid water. Lowering a cloud's temperature below freezing changes some of the "droplets" into ice crystals but, more important, some droplets remain liquid in a "supercooled" state. When such droplets are violently disturbed, being struck by an airplane wing for example, they freeze almost instantly.

Ice works fast. In recent research flights in the vicinity of a western mountain range, a typical 250-hp high-wing cabin monoplane was flown into large air-mass cumulus clouds. At a temperature of 21 degrees F, liquid water was measured at two grams per cubic



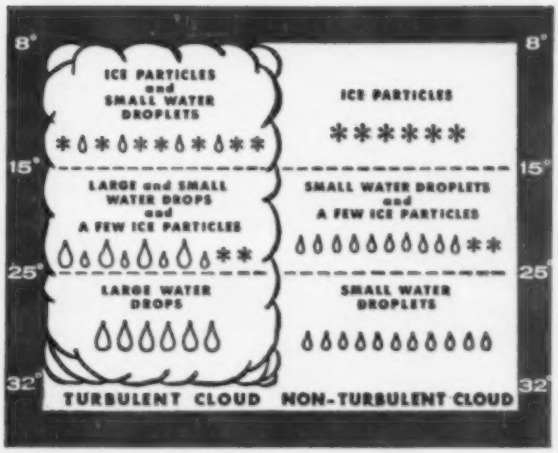
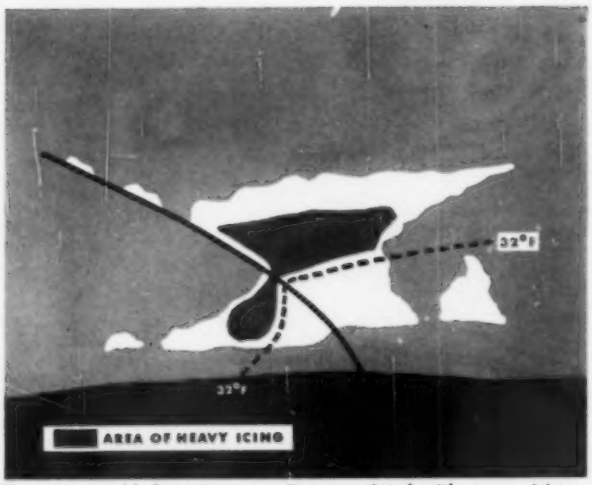


Fig. 1. By estimating water content of a cloud, theoretical rates of ice formation can be calculated. Fig. 2, *right*. The relationship of rate of icing to the diameter of droplets. (Graph set up for about 100 mph.)



The winter cold front is most often associated with severe icing.

meter. After one minute the aircraft was not able to maintain its altitude of 18,000 feet—this in a semi-arid region away from any large source of moisture!

Maximum observed ice intensity within relatively smooth clouds amounts to one-quarter inch per minute—about equal, per minute, to a 50-pound block of ice spread evenly over the front surfaces of the aircraft. For an aircraft heavily loaded with passengers and baggage this extra weight could be the final factor—no way to go but down.

Rime ice is coarse and rough and the added drag shows up quickly. The cleaner the aircraft aerodynamically, the faster and the greater the loss of airspeed. In a modern light-twin of the Aztec, 310, or Travel Air class, the loss will be as much as 40-45 mph. Even with anti-ice equipment the ice which builds up on unprotected areas is enough to drag down speed.

The pilot of the typical aircraft lacking full protection from ice has a simple rule—keep away from icing conditions. This is fine—in theory. In practice it doesn't always work. Even with the shrewdest flight planning, ice sometimes becomes an unbidden, ominous guest. The best anti-ice equipment is not always a mechanical device—frequently it is simply the pilot's brain.

The cloud types shown in Fig. 1 produce different types of ice. Non-turbulent stratus with small droplets produces rime ice. Turbulent cumulus with large droplets produces glaze ice. In general, the severest icing for both types is met at 25 degrees F.

The usual description of the effects of icing amounts to a list of individual items which cause difficulty or affect flight performance.

This isn't much help to the pilot who runs into icing and wonders how much ice has accumulated and how much accumulation can be tolerated before altitude, or control, is lost. These are embarrassing questions to people who write articles about ice.

They quickly take refuge behind words like these: The rate of ice accretion depends on (1) the airspeed of the aircraft—high speed, rapid icing, (2) size of cloud droplets—large drops, rapid ice, (3) amount of liquid water content in the cloud—high content, heavy icing, (4) design of the aircraft—awkward design, rapid icing (in this respect a biplane would be considered an awkward design alongside a modern cabin monoplane).

The pilot who has no experience with ice needs something more than this. He needs a scale of some sort, even average or theoretical values, with which to measure the degree of trouble he may get into.

The heart of the matter is estimating what effect the cloud will have on ice accumulation. Cloud particles vary in size according to cloud type. It is generally agreed that in smooth stratus the favored average diameter is .01 millimeter. (A grain of sand measures .08 millimeter.) The cloud droplets increase slightly in size through cumulus of fair weather, stratocumulus and, finally, in nimbostratus, the "wet" cloud, *average* droplets grow to nearly .03 millimeter in diameter. Even light turbulence will create much larger than average water droplets.

This is not useless information. It is necessary to appreciate the fact that cloud differences are not limited to classification of types. When droplet size is linked to the amount of liquid water contained in a cloud, the rate of ice accumulation can be estimated. Liquid, or visible water content, refers basically to the number of water droplets in a given (*Continued on page* 70)

The 9800 is clean and free of drag items. The antennae are housed in fiberglass wing tips. The P&W R985 engines are fuel injected.

CONRAD 9800

AN AERODYNAMIC AND POWER-PACKAGE REFINEMENT

Below: Modifications include three-blade Hartzell props, beefed-up landing gear doors that permit gear-down speed up to 160 mph.

A check pilot report covering key performance characteristics and the airframe-engine modifications found in this conversion of the Twin-Beech.

By RICHARD L. SWEENEY

IMPROVED PERFORMANCE and handling characteristics of the Conrad 9800—including good slow-flight and stall characteristics and a true airspeed, at 67 per cent power, of 228 mph—can be keyed to the aerodynamic and power-package refinements incorporated into this Twin-Beech conversion, evaluated by FLYING at Burbank, Calif.

Developed by Conrad International Corp., Cincinnati, O., the modification increases the aircraft gross weight to 9,800 pounds (hence the designation "9800") and includes fuel injection for the Pratt & Whitney R985 engines, plus the standard rework that is necessary to the conversion.

To date Conrad has engineered some 90 conversions, and feels that their market exists with Beech Ds and E18s, along with the tremendous number of Beech C-45 Gs and Hs being turned loose by the Air Force.

Cost of the Conrad 9800 kit is $15,450. The fuel-injection kit is priced at $5,100. Approximately 760 man-hours are required for the installation of the 9800, and 180 man-hours for installation of the fuel injection. Man-hour prices vary from region to region; modification is being handled by these seven Conrad distributors:

Wright Brothers, San Jose, Calif.; Crest Conversions, San Antonio, Tex.; Capital Aviation, Springfield, Ill.; Reading Air Service, Reading, Pa.; Bristol Aero Ltd., Winnipeg, Manitoba, Canada; Aero Corp., Atlanta, Ga.; and Airline Training Inc., Ft. Lauderdale, Fla.

Airplane used for this evaluation bore registration number N9800 and was equipped with fuel injection and Hartzell three-bladed propellers. Along with FLYING's pilot were H. Randolph "Randy" Knowlton, Conrad's sales manager who occupied the copilot's seat, and Robert Hansen of Volpar, Inc., manufacturers of the tricycle landing gear kit for the Beech 18 series.

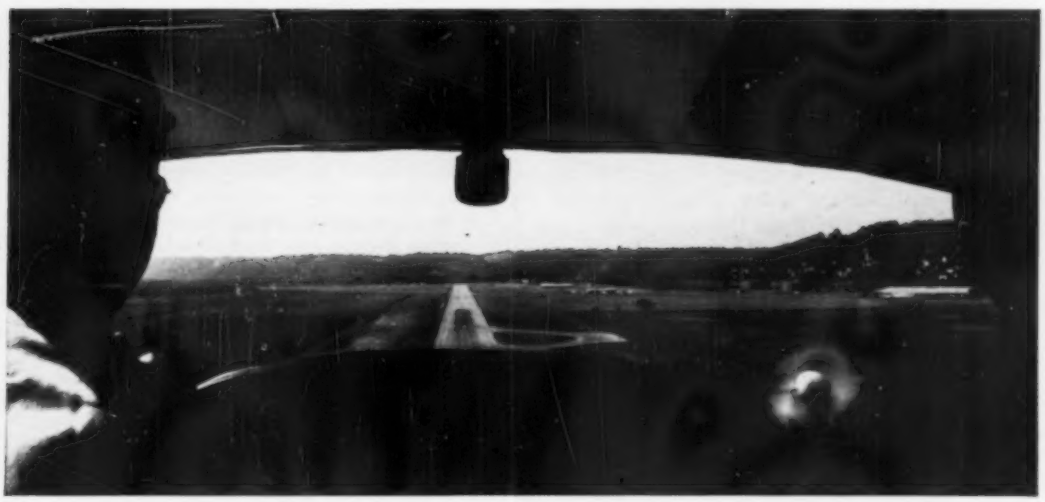
Performance checks in evaluating N9800 consisted of standard takeoff with climb at a rate of 1,000 fpm or better held to 10,000 feet MSL, using 300 hp and best-climb speed of 135 mph IAS. Takeoff gross weight was 8,438 pounds, at which time the ground temperature was 29 degrees C.

Timed runs between Burbank, Oxnard omni, Santa Barbara, Los Angeles, Ontario and back were flown at power settings of 60 per cent (270 hp) and 67 per cent (300 hp) achieving true airspeed values of 220 and 228 mph respectively. Ambient temperature was 11 degrees C, some 16 degrees C above standard at 10,000 feet MSL, in effect giving the aircraft a density altitude of 12,000 feet performance-wise.

Calibrated runs between Long Beach omni and Oxnard, 61 nautical miles distant (122 miles round trip), have been made in 16 minutes, nine seconds one way and 16 minutes, 10 seconds in the other direction (practically zero wind).

Using maximum endurance power setting of 24 in. mp and 1,700 rpm, the 9800 indicated 163 mph at 10,000 feet, truing out at 197 mph. Fuel consumption at this power setting, according to Randy Knowlton, averages 15 gallons per hour for each engine. Flight characteristics in various configurations were checked following the timed runs.

Control pressures under all flight conditions were found to be relatively identical with those of the standard Twin-Beech. However, response rate was appreciably better in roll and pitch due to elevator gap seals and modified wing tips. The aircraft trimmed out very well for "hands-off" flight under all conditions involved.



Left: A one-piece windshield affords improved visibility, evident during the final approach.

Stall characteristics proved excellent with high aileron effectiveness throughout the entire range. The airplane can be flown from cruise trim until it runs out of elevator before encountering loss of lift and stall break, even in clean configuration.

In checking stalls at 10,000 feet MSL, the airplane was trimmed out to cruise condition in clean configuration, the power cut and a medium nose-up attitude assumed. At 90 mph IAS, the 9800 ran out of elevator and, as full back pressure was held, tended to oscillate longitudinally and lose altitude. The oscillations, however, were not severe.

With everything down, power on both engines reduced to zero thrust and with cruising trim, loss of elevator effectiveness occurred at 70 mph and, as back pressure was held, the airplane finally pitched down in a "loss-of-lift" break. Full up (*Continued on page* 102)

Manufacturers aim for an expanding European market.

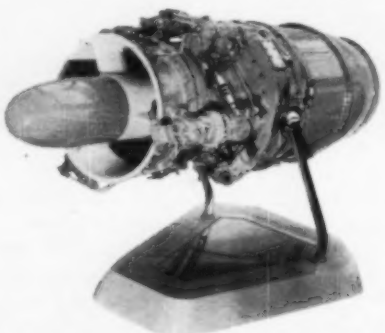
BRITISH ENGINES FOR

A POTENTIAL business aircraft market in Europe is attracting considerable attention among engineers in England. Those at Rolls-Royce, Bristol Siddeley, and de Havilland who were interviewed by the author on a recent visit to England corroborated this fact. They are studying new small engine designs and in some cases are carrying out development programs on various types in order to be able to provide the kinds of engines that will be needed. There appears to be no one optimum type of business aircraft; similarly no one engine type will meet all requirements. A variety of engine types and sizes will be required.

Few companies in England today have their own aircraft for transportation of executive personnel. For the most part business men rely on trains and automobiles for transportation, and for longer distances use the airlines. The tremendous development in business activity now taking place in Europe, however, is expected to alter this situation. Rapid transportation of executive personnel will become more and more important, especially with the growth of the Common Market areas. Business aircraft can provide the best answer to this problem.

Rolls-Royce RB-108s power Short SC.1 VTOL.

The time savings possible with even relatively slow aircraft are very large. M. Jeffries, project engineer at Bristol Siddeley, pointed out that with a Dakota (DC-3) or with some of the smaller piston-engine aircraft, the time saving over any form of surface transport is very large indeed. In fact, the flight time portion of most trips is such a low percentage of the total that there is not much gain from using a sophisticated airplane such as a jet or turboprop. He cited an example in which by using a company aircraft an engineer was able to visit two separate cities in the English midlands and return home to Bristol on the same day. The same trip by train would have required him to spend two days with one night away from home.



Bristol Siddeley Viper 11, thrust 2,500 lbs.

Range requirements for business aircraft in Europe appear to be much less than in this country, perhaps only a third of what is needed here. It would be desirable, for example, to fly from coast to coast with only one refuelling stop, corresponding to approximately 1,500 miles in range. In Europe a 500-mile range appears to be ample.

Part of the transportation problem stems from the rapid increase in the number of automobiles on the highways in Europe and the resultant major traffic problems in and around cities. This, among other things, has slowed down traffic to and from airports. There would be a great advantage in being able to fly directly to the office or factory to be visited and enable the businessman to avoid the time delays on the highways. Helicopters seem to provide a logical answer and Dr. Eric Moult, technical director of the de Havilland Engine Company, believes that many business people will therefore prefer to use helicopters for business purposes rather than conventional types of aircraft.

The performance requirements and general characteristics for helicopter engines seem to be met best by the turbine engine. Its light weight—from a third to a fourth of that of the equivalent piston engine—and its small size make it particularly attractive for use in helicopters. Light weight means of course that more of the gross weight of the vehicle can go into payload. While the fuel consumption of the turbine is not as good as that of the piston engine, it is acceptable. Other advantages of the turbine are its smoothness and, if a free-wheeling power turbine is used, elimination of the clutch. Both of these factors lead to further weight savings. Experience also has shown that maintenance and overhaul costs are reduced compared to piston engines.

Dr. Moult believes therefore that "we shall see a rapid transition of helicopters to turbine drive and more efforts to reduce weight and cost of the power units." De Havilland is very much interested in this field. The firm has a 1,200-hp Gnome helicopter engine, and a General Electric T-58 which it is building under license (it is light and efficient and will undoubtedly find many applications).

In order to meet requirements for a turboprop engine, de Havilland also has modified the Gnome helicopter powerplant by adding gears and a propeller shaft. They expect the rating to go up to 1,500 hp with further development.

But, while helicopters offer advantages for business purposes, some people believe that VTOL—vertical take-off and landing—aircraft would be a better solution to the businessman's transportation problem. It would permit him to land at or near his final destination and at the same time enable him to travel at high speed for long distances. VTOL aircraft, however, seem a long way off because of the formidable development problems involved. They are believed by many to be the ultimate

FUTURE BUSINESS AIRCRAFT

By A. T. GREGORY

airplane for the needs of businessmen and executives.

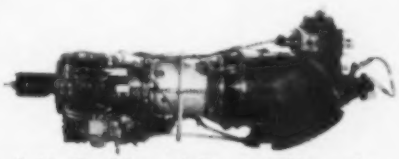
Many forms of VTOL aircraft have been proposed. Some, like the Hiller X-18, have wings which are horizontal for normal flight, but rotate to the vertical position for takeoff and landing. With propeller-driving turbines mounted on the wings adequate lift is provided for the takeoff with the engines in vertical position. Other proposals have used fixed wings with turboprop engines mounted so that they could swing vertically for takeoff and landing. Still another and perhaps the oldest VTOL proposal is one which was advanced by Rolls-Royce during World War II. In this system turbojet powerplants are used as pure lifting engines while other engines are used solely to provide forward thrust after the takeoff.

Rolls-Royce RB-108 lift engines can be paired.

Rolls-Royce has done a great deal of development work in the VTOL field. Recently, some of their RB-108 VTOL engines have been flying in the Short SC.1 VTOL research aircraft. The aircraft was demonstrated at the last Farnborough Show in September. It has successfully made the transition from vertical to forward flight and back again. Four RB-108 engines are used for lifting the aircraft and a fifth for forward flight.

The RB-108 engine produces a thrust of 2,200 lbs. at a thrust/weight ratio of 5.2. Advanced types of VTOL engines with more thrust and higher thrust/weight ratios are under development. Thrust/weight ratio is the all-important criterion of a VTOL engine as it governs the amount of load that can be carried.

Bristol Siddeley also has been studying the use of direct lift engines, and technical director Dr. S. G. Hooker has proposed a configuration for a fan type engine which he believes could produce a thrust/weight ratio as high as 14/1. This will be very attractive since the lifting engines then would constitute only approximately seven per cent of the aircraft gross weight.



De Havilland Gnome helicopter turbine engine.

While Rolls-Royce engineers are enthusiastic about VTOL possibilities for transports and other types of aircraft, they do not feel this way about business aircraft. A. H. Fletcher, design manager, believes that two particular problems with VTOL, namely recirculation and noise, will prove to be serious deterrents to its use in business aircraft.

Because of the recirculation problem VTOL aircraft will have to use a steel or paved platform for takeoffs and landings. Otherwise inlet clogging and contamination with debris could cause engine shut down and/or deterioration. In one instance when landing in a hay field the engine inlet became so clogged with the hay that it stopped the engine.

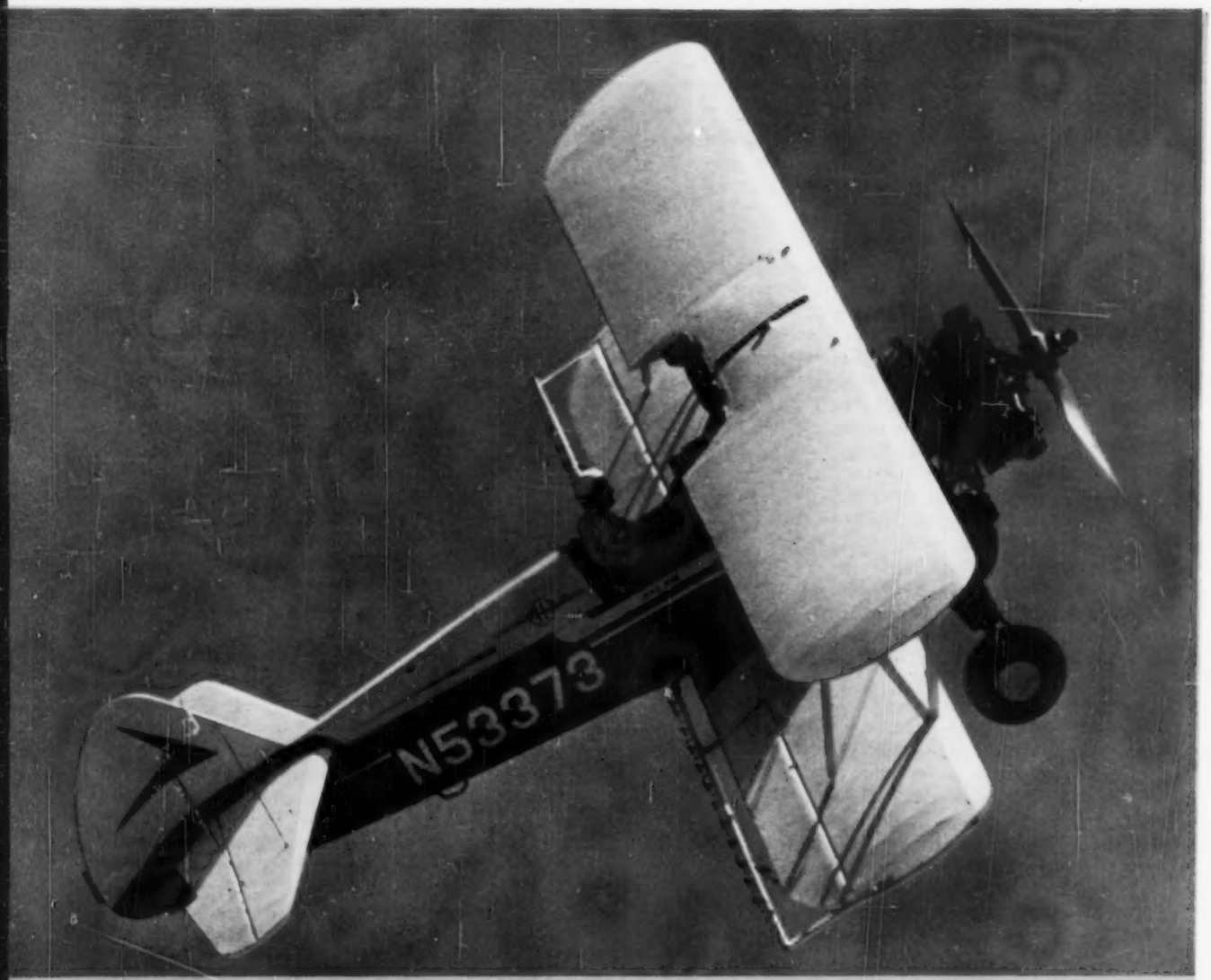
But paved platforms will not be available everywhere, and business aircraft must be capable of using unprepared fields to develop their maximum utility. In order to overcome the recirculation problem Rolls now favors a rolling takeoff, using speeds up to about 30 knots for a distance of approximately 50 yards. This is not STOL—short takeoff and landing—performance, but only a slight change from the strictly VTOL concept.

The worst feature to be overcome in VTOL aircraft, however, is the noise, which would make it necessary for the aircraft to land and take off at locations remote from inhabited areas. The turbofan type lifting engine would be an improvement over the straight jet in this respect, but still not enough. Perhaps the aircraft could taxi to a far corner of the field and take off from there, if nobody lives nearby. But this means that VTOL aircraft will have to land in a big field and taxi back and forth across it, which takes time, especially if the field is a bit rough. Noise therefore might place an undue restriction on the use of VTOL aircraft.

With regard to conventional type aircraft, Fletcher believes that the turboprop engine is more suitable than the turbojet for business or executive aircraft because of the short-field takeoff requirements. Takeoff and landing performance of the turboprop airplane is close to that of the piston-engine airplane. It therefore will be able to use more and smaller airfields than the jet.

In the turboprop engine field the Rolls-Royce Dart is without doubt the world's best known engine. It has been used in a great many aircraft, both on the airlines and in private or executive type service. The engine has had a long and remarkably satisfactory service history. It probably will be used in executive aircraft for many years to come. Initially, the Rolls-Royce Dart engines were rated at 1,400 shp, while the newer Darts will develop upwards of 2,400 shp.

While the main effort at Rolls-Royce is still on big engines, according to Adrian Lombard, director of engineering, they also are study- (*Continued on page* 90)



Using his knees to help maneuver the control stick, Mike does a lazy-eight.

an eagle with one wing

Mike Jose lost an arm in a prop accident and then came back to achieve the "impossible" and rank himself among the country's top all-around pilots.

By GEORGE S. ROSS

IT WOULD BE downright impossible to single out from among America's 862,099 licensed aviators the "Country's Best Pilot."

But it is safe to assert that there's nobody in the country who can fly like "Big Mike" Jose.

We're talking about a 225-pound, six-foot-four redheaded California crop duster pilot who drives a 450-hp Stearman back and forth across the spinach for a living, flies in air shows for fun, and holds active commercial, instrument, instructor's and multi-engine ratings.

So what's the story?

Mike does it with one hand.

No gimmicks, no trick controls, no special waivers. And don't expect the FAA to overlook, for instance, a chance to pull an engine on you 10 feet after takeoff in the Twin-Beech. They've done it to the one-handed pilot, and he has the rating to prove it.

That's only part of the hard-to-believe story of Mike Jose, the one-winged eagle, the dusterman they "should" have grounded but couldn't.

I first saw Mike Jose fly his 450-hp Stearman duster before a crowd of 100,000 at the Oakland Air Fair on a hot, windy California Sunday — a clean and precise demonstration that the airplane is a farm tool of increasing versatility. A Stearman duster is among the last places to look for a guy with his right sleeve tucked in at the shoulder.

There was just about enough room for Mike, that day at Oakland Municipal Airport, as the announcer confirmed that the big one-armed man carrying a chute to a waiting airplane really meant to get in it and fly it.

"Next event," he said matter-of-factly, "will be a demonstration crop spraying flight by Mike Jose, pilot for United-Heckathorn, in the red-and-white Stearman now taxiing for takeoff."

The big engine pulled the plane up in a steep climb, and Mike circled up, over, and down to just a foot off the runway, white spray swirling and misting in the prop wash, then up, over and down again, in a smoothly arced stretched-out half lazy-eight, back down to field level plus a foot, back and forth. On his last pass Mike executed an "emergency release" of his remaining spray load and pulled up in a steep climbing 180, back over the crowd. It was flying at its best.

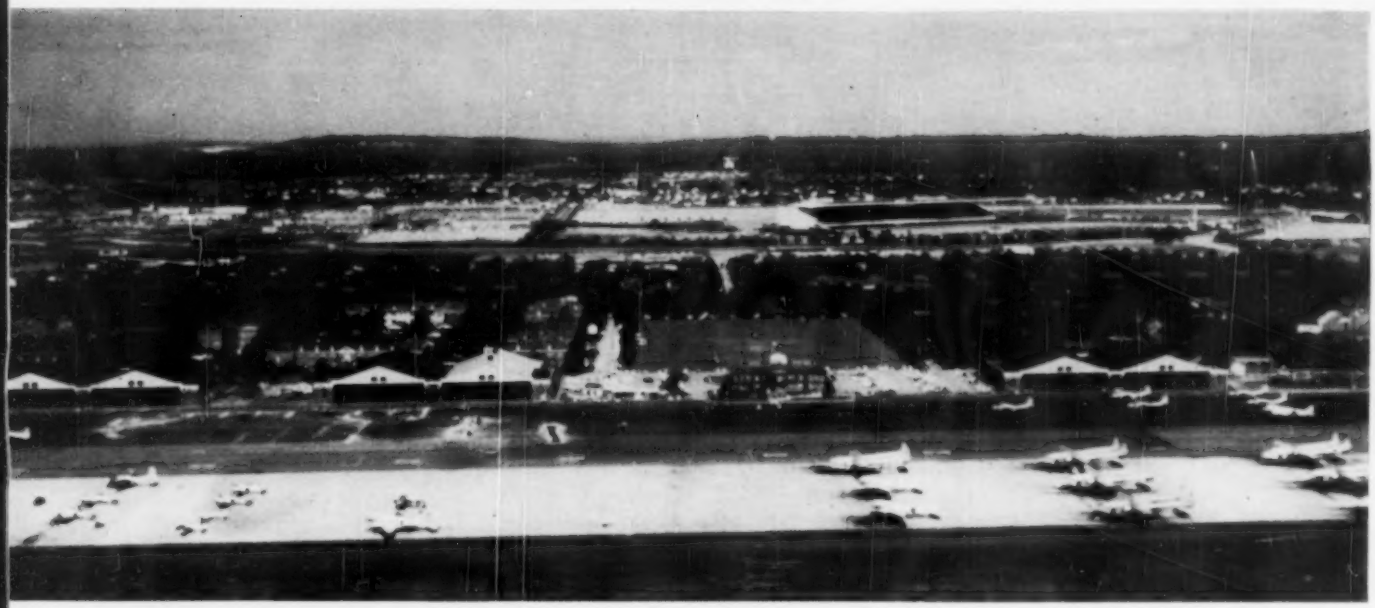
Mike Jose is no daredevil. He's a precision-perfect specialist in a close-tolerance business, a confident, careful pro who fully expects to fly right into retirement.

The planes he flies aren't re-rigged with simplified controls, and for that matter Mike isn't re-rigged either—nor is he a cripple.

"There's no 'help the handicapped' committeeman up there flying copilot," Mike says. "The only handicap you have to overcome is in yourself. If you can't adapt, and if you don't compensate, you've got no business in an airplane."

Mike's adaptation to life's tough knock started July 2, 1946, less than a year after he had saluted for the last time as Army Air Corps Lieut. Michael Ross Jose, service pilot and flight instructor with more than 3,000 hours in his log books. He had shut (*Continued on page* 87)

Mike making a perfect three-point landing in a Stearman duster as he returns from a spray run to a ridge-top field for another tank load.



After WWII role as defender of New York, the now Mitchel AFB became home of Air Force Reserve and C-119s of the 514th Troop Carrier Wing.

MITCHEL FIELD...
a History and Heritage

IN THE EARLY morning of July 6, 1917, a new pilot was putting a Spad pursuit through its paces over Gerstner Aviation Camp in Louisiana. Though aerobatics were not unusual at Gerstner, interested spectators gathered to watch. For the pilot was Major John Purroy Mitchel, the former mayor of New York.

Though old for a student, at 38 years Mitchel's flying ability was well above average and his progress had been watched with great anticipation by the Air Service. He was expected to become an outstanding air leader.

Suddenly the Spad nosed over sharply and the leather-jacketed figure of the pilot was seen to fly from the cockpit. Both aircraft and pilot crashed to earth.

Mitchel had complained of the safety belt restricting his movements in the cockpit and had taken to flying with it unfastened. For this he paid with his life. Ten days later the Air Service named an airfield site—east of Hempstead, Long Island—Mitchel Field.

From the resounding beat of marching British and Hessian troops during the Revolution to the receding echo of a swift jet fighter during the Korean War, the area now known as Mitchel Air Force Base has played an active military role in every war fought by the United States. Even before the Revolutionary War this land—some 30 miles east of Manhattan and then known as Hempstead Plains—was used for drills and reviews. Recruits for the French and Indian Wars trained here.

Purchased from the Indians on July 4, 1657, Hempstead Plains was the only natural prairie east of the Allegheny Mountains. And it was treeless. During the Revolution the 17th Light Dragoons of the British Army were stationed on the plains, which served as a supply base for troops in the New York and Long Island area.

Soldiers were trained here during the War of 1812 and in the Mexican War in 1846. During the Civil War it became known as Camp Winfield Scott and during the Spanish-American War, as Camp Black.

On July 21, 1874 occurred an augury of things to come. W. H. Donaldson flew a free balloon from New York City to Lynbrook and then to Hempstead. After a moonlight flight that evening he landed on Hempstead Plains on land now part of Mitchel Air Force Base.

In 1909 Glen Curtiss flew his airplane from a field just east of nearby Mineola. He was awarded the Scientific American Trophy and a prize of $10,000 for his sustained flight over a distance of 25 kilometers.

On August 13, 1909 Charles F. Willard made a forced

In 1928 Mitchel was surrounded by open fields.

Maj. John Purroy Mitchel

Lieut. Al Williams with Curtiss Racer at Mitchel in 1925 for the Pulitzer race.

From the first years of powered flight the famous Long Island field has played a key role in the development of U.S. airpower.

By GERALD J. SCHLAEGER

landing while on a cross-country flight. Since forced landings were common occurrences then, aviators soon came here to fly their airplanes over this natural flying area. Roads surrounding the flying field were filled with spectators' autos.

On September 17, 1911 Mr. Calbraith P. Rodgers left Mineola Field on his historic attempt to span the continent by air. After 49 days and many forced landings and repairs, he arrived in California to complete the first east-to-west transcontinental flight.

In September, 1911 two Army airplanes, piloted by Lieuts. T. D. Milling and H. H. Arnold—who became the first and only five-star flying General officer—were flown in the Nassau Boulevard Air Meet at Garden City.

As the land near the flying field was developed, a new field was selected one mile east. It became known as Mineola Air Field or Hempstead Plains Aviation Field. In 1915 the National Guard made it a military field and renamed it Hazelhurst Field. During World War I it was renamed Roosevelt Field in honor of Quentin Roosevelt, who had trained there and later was shot down over France.

Leased from the government on July 1, 1917, the land became known as the Aeronautical General Supply Depot and Concentration Camp, and was used for the storage and distribution of supplies to the nearby training fields.

Even before the field was named in honor of Mitchel in 1917, it was the home of the First Aero Squadron, which had formed there, then served under the command of Captain Foulois with General Pershing in the punitive military expedition into Mexico in 1916. The Squadron returned to Mitchel, (*Continued on page* 93)

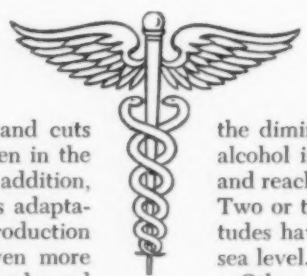
A physician warns that pilot efficiency can be lowered to dangerous levels in critical situations.

EFFECTS OF DRUGS, TOBACCO AND ALCOHOL

By JOHN T. FLYNN, M.D.

THE PILOT who carefully checks the weather, the condition of his aircraft and his flight route may still be overlooking one of the most important items on his preflight check list: his physical and mental condition. Factors which might be harmless on the ground can make the flyer his own worst enemy in the air, especially when he faces a tussle with bad weather or a wearying, prolonged flight in difficult conditions.

Tobacco, for example, holds a concealed hazard for the airman. Carbon monoxide makes up three per cent of cigarette smoke, and five to eight per cent of cigar smoke. A pack of cigarettes used in one day can cause a four to eight per cent saturation of the blood with carbon monoxide. This interferes with the oxygen-carrying capacity of the blood hemoglobin, lowers the eye's light sensitivity and cuts night vision 20 per cent. Diminished oxygen in the air at altitude heightens the problem. In addition, the nicotine in tobacco decreases the eye's adaptation to the dark; it increases body heat production by 10 to 15 per cent, which requires even more oxygen. Smoking increases tremor of the hands, and may irritate sinuses and ear passages, causing partial blockage and pain on change of altitude. Careful tests have shown that tobacco can lower the pilot's tolerance for altitude as much as 5,000 to 6,000 feet.



Those extra "drags" can cause more drag on the pilot than he realizes.

The effects and eccentricities of alcohol should be clearly understood by the pilot. Alcohol taken on an empty stomach appears in the blood in a few minutes, reaching a peak in one half to two hours. When eight highballs are taken over a four-hour period, considerable alcohol can still be found in the blood after 16 hours. Ninety per cent of the alcohol absorbed is burned by the body, at the steady rate of about two teaspoonsful of pure alcohol per hour. Very little is eliminated by the kidneys, skin, or lungs. This rate of alcohol destruction in the body is slowed by the other substances in beer and whiskeys and may be hastened by inhalation of oxygen and carbon dioxide. Exercise does not increase the rate of burning; nor does black coffee, which merely stimulates the brain from the depression that is caused by alcohol.

The important fact to remember about alcohol is that *all of its effects are produced by depression of the nervous system*, not by direct stimulation, no matter how "high" the subject may feel. Important nerve centers in the brain and spinal cord, where alcohol tends to stay the longest, are interfered with, resulting in temporary release of emotions and instincts from usual control. Careful testing of subjects under the influence of even small amounts of alcohol has repeatedly shown that skilled acts are performed less efficiently, and that acuteness of the senses and of memory are dulled. Skilled instrument pilots, after consuming one half to one ounce of alcohol, showed measureable deterioration of performance in a Link trainer. Critical judgment and the sense of responsibility are affected; interpretation of codes or signals is slowed or confused. A person under the influence of alcohol has more trouble turning his attention from one group of signals to a new set, and is much slower to grasp their meaning. Immediate memory for very recent events is dulled anywhere from 10 to 45 per cent after one to four ounces of whiskey.

With alcohol, the eye movements are less efficient when reading or fixating on an object, and operate at only 20 per cent efficiency after even one or two ordinary cocktails, or after a pint of beer. Also, the area visible to each becomes narrower, so that aircraft approaching at the edges of ordinary vision would not be seen at all. Night vision is badly affected. After as little as six ounces of alcohol, nearly twice as much light may be needed to see at low levels of illumination.

Alcohol prevents the body cells from using oxygen properly, so that even at moderate altitude the person with alcohol in his blood is especially vulnerable to the diminished oxygen in the air. Also, at altitude alcohol is absorbed more rapidly than at sea level and reaches higher levels in the blood more quickly. Two or three drinks at 10- to 12-thousand foot altitudes have the same effect as four to five drinks at sea level.

Other effects of alcohol include easier onset of airsickness and dilation of skin blood vessels with steady loss of body heat, which may become a serious hazard during prolonged exposure to cold. Stomach acid is markedly increased by alcohol and may aggravate a peptic ulcer or other digestive disturbances. Any liquid, even water, taken the morning after can cause a return of intoxication symptoms in some persons. In general the pilot should abstain from alcohol for at least 18 hours, and preferably 24 hours (*Continued on page* 100)

The 160-hp Ryan PT-22 with top speed of 125 mph, was an Army Air Corps primary trainer when World War II began.

A pair of jet pilots with a yen for a taste of open-cockpit flying take on the thundering, spirited PT-22

At last the wind

By DICK BACH

HANK MASON leaned against the wing. "That's a lot of money to pay all at once," he said thoughtfully.

"I know," her owner said, "but banks won't finance an airplane this old, and I can't afford to take less than the price I'm asking." He adjusted the for-sale sign on the heavy wooden propeller.

Their talk grew and faded as I walked around the airplane, touching the silver fabric and moving the ailerons. She was a beautiful machine. Dark blue in her fuselage and tail, long streaks of bright orange streaming back from her spinner, wings shining like collector's silver. From her deep-grooved new tires to the tip of her waxed propeller, she was the prettiest airplane of her class we had seen since first we trod the many flight lines of Southern California.

But her beauty wasn't the reason we considered buying the bright machine. My friend and I had learned to fly in airplanes as closed as plexiglas and sheet metal could make them; we had each flown over a thousand hours in smooth-humming, wind-free airplanes. The airplane that Hank leaned against now had a five-cylinder radial engine with short, unmuffled exhaust stacks. It had no cabin, no canopy. In line behind the point where the flying wires met the fuselage were two small windscreens and two open cockpits.

"I think she's about the smoothest PT-22 you'll find," her owner said. "Fun to fly. Little noisy, though," he added, "and windy."

From the other side of the airplane I could see Hank smile faintly. "I don't imagine you have time to give a demonstration flight," he said.

"Oh, I think so," the man said. "If you like, we can take her up right now."

They did. Just 40 minutes later Hank and I owned an airplane.

And so it came to pass, that after five years as a pilot, I flew for the first time. In the back of my mind was a little fear that I had expected too much, that the real airplane wouldn't be the joy that my imagined one had been. I folded myself into the front cockpit, and Hank, fresh from his checkout, stayed in the rear one. From my position a few feet behind the big radial engine, the roar was deafening. I was vaguely aware of a very faint voice behind me, and turned my head. "You go ahead and make the takeoff," Hank shouted for the third time. I nodded.

We rolled out on the long taxiway, and I S'ed the airplane back and forth across the yellow line more than necessary; here I had no tricycle landing gear or full-circle visibility.

In front of me now was a steep-angled nose, three black cylinders jutting through the cowling, a blurred wooden disc, and the white-flecked sky. I would have been content just to taxi the airplane all the rest of the wonderful afternoon.

The sound of the engine was (*Continued on page* 101)

NEWSREEL

ARMSTRONG WHITWORTH Argosy *(Right)*. Turboprop freighter is powered by four Rolls-Royce Dart 526 engines of 2,105 ehp ea. Span is 115 feet; range, with 20,000-lb. payload, 1,600 miles. Cruising speed 280 mph.

AVRO 748 *(Below)*. Prototype of 44-passenger, medium-range, pressurized turboprop transport with excellent short-field characteristics, is powered by two Rolls-Royce Dart 514 engines of 1,720 ehp ea. Span 95 feet.

THE ANNUAL S.B.A.C. (Society of British Aircraft Constructors) air show held at Farnborough is Great Britain's aviation industry's "show window." Besides the vast number of spectators it attracts, Farnborough also is visited by representatives of many foreign nations (115 countries were represented this year) and is instrumental in close to $500 million of British aviation industry's export business. The show is a blend of flight demonstrations of military and civil aircraft, brilliant aerobatics by England's foremost test pilots and military teams, and static displays ranging from guided missiles and aero engines to every conceivable aircraft accessory and component.

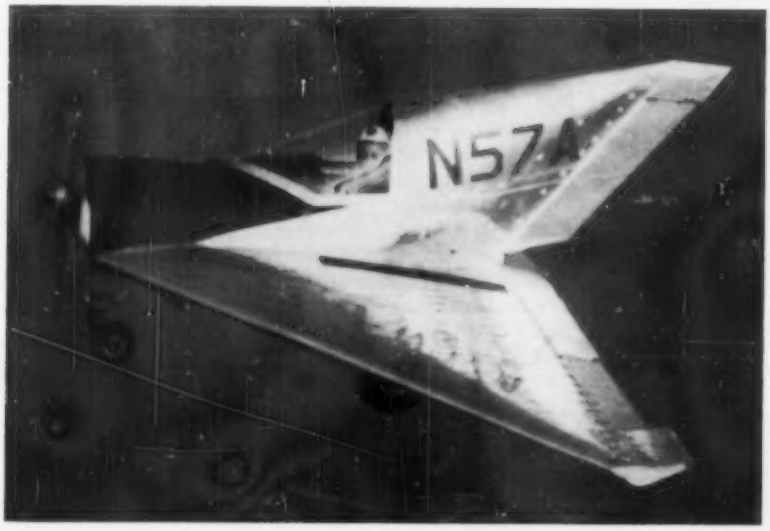
Below: The internationally famous Farnborough show drew 250,000 spectators. In the foreground are: left to right in semicircle, Vickers Vanguard turboprop airliner, Handley Page Victor bomber, Handley Page Dart Herald turboprop transport and an Avro Vulcan delta-wing bomber.

FLAT RISER. Short SC.1 VTOL is considered a technical triumph in vertical-lift aircraft. Transition from hovering to normal flight is accomplished without sink usually associated with this type of aircraft. Five Rolls-Royce 108 engines.

NEWSREEL

COMANCHE 250 *(Right)*. Piper Aircraft's line of Comanches for 1961 is available in four versions for each of the 180 and 250 models. Refinements include new instrument panel with center-mounted radio, standard toe brakes in addition to hand brake lever, new cabin heating and ventilation systems. AutoFlite models have AltiMatic auto-pilot, with preselected altitude and course hold, and AutoNav automatic radio direction finder. The 250 is available with optional 90-gallon fuel capacity.

FRENCH FLYING WING *(Right)*. Fauvel AV.45 auxiliary-powered sailplane is a variant of popular AV.36 glider. Powered by a 40-hp, two-cycle Nelson engine *(above)*, it is available with feathering propeller to reduce drag while soaring. Construction is all-wood. Landing gear has one nose and one center wheel.



HOME-BUILT DELTA *(Left)*. Martin Baker, a mechanic at Wright-Patterson AFB, O., designed and built this all-metal delta-wing sport plane. Wing span is 18 feet, gross weight 860 pounds. The plane is powered by an 85-hp Continental engine. Cruising speed 127 mph. Construction cost was around $1,500. Baker believes plane will make ideal midget racer.

MEYERS 145 *(Right)*. Production of two-place all-metal personal plane, which was abandoned several years ago by Meyers Aircraft Co., in favor of the four-place Meyers 200, has been resumed. Powered by a 145-hp Continental, the plane has a cruising speed of 150 mph at 3,000 feet. Price for standard model will be $7,950, for the deluxe $8,700.

NO. 247

I learned about flying from that!

A short field takeoff with a strong crosswind proves a jarring reminder to check aircraft performance charts.

By PERCY KNAUTH

Author of "Wind on my Wings," Doubleday and Co., Inc.

IN THE EARLY DAYS of flying the takeoff was often a suspenseful undertaking, but nowadays, with more than enough power and usually many times the length of runway needed, we might tend to take it for granted. Until the day, that is, when maybe there isn't quite as much runway as we would like to have. That brings me to Griswold Field in Clinton, Conn. on a bright and windy morning in September of this year.

At Griswold, I learned what a takeoff really is, and I won't soon forget it.

Griswold is a field with no pretensions; it is as plain as grass, 1,600 feet of slightly rolling, hummocky sod packed down by years of use (until recently, a sign at the entrance from the Boston Post Road just outside advertised $5 rides in the Bird Safety Plane, which gives some indication of how old it is). The runway points north and south, with the southern end fading out into a shallow creek bed, a quarter mile or so of marshland, then some sand dunes and finally the beach and the waters of Long Island Sound. The northern end is more abrupt: there is a wooden fence, a road, a line of telephone and power wires and an imposing row of fine old trees. In a Cub or an Aeronca you can drift in over those trees without much worry, but in anything bigger you have to skim them close and drop down sharply if you want the better part of that 1,600 feet ahead of you when you touch down.

As for taking off, by all odds the best way is to keep the trees safely at your back and head off toward the low land and the Sound—if you can.

When I looked down on Griswold from a bouncy 1,500 feet of altitude on this particular day, my heart sank. I had taken off from Montauk, another one-strip airport on the tip of Long Island, some 25 minutes before in my Tri-Pacer with a 20 mile-an-hour wind blowing at right angles to the runway. Since Montauk runs more or less northeast-southwest, I had figured that at Griswold the wind would be pretty much directly down the runway, a bit of hasty calculation which I now drastically revised. I saw that it was blowing, and blowing hard, at a 45-degree angle or better across that brown, patchy piece of land where I was coming down. I'm not too fond of crosswinds—one doesn't get to practice in them often enough in this era of multi-runwayed fields—but my son was waiting down below for me to pick him up, so I tightened (*Continued on page* 82)

"She put her left wing down a hair . . . we were level with the trees now, and the topmost branches reached for the wing."

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New Aids

(Continued from page 34)

from Runway 13 that is lighted by pancakes spaced only 10 feet apart. This presents better directional guidance for a pilot.

To investigate the fog-penetrating qualities of its many experimental lighting systems without having to wait for suitable weather, NAFEC uses a battery of fog-generators. The machines, designed by the Army Chemical Corps, give off dense "smoke-screens" to simulate thick fog.

The range of lighting experiments going on at NAFEC is too broad to detail completely. The few programs already described give some idea of the scope of the investigations.

VOR omniranges already largely have supplanted the old low-frequency radio ranges for airborne navigation in the United States. The ICAO adopted VORTAC (a combination of VOR and distance-measuring equipment) as the international standard for short-range navigation.

Ideally, a VOR transmitter should be located as closely as possible to a major air terminal. But obstacles, natural or man-made, often cause reflections of signals at the most desirable locations; these reflections cause "bending" and scalloping of the transmitted signals, resulting in inaccurate information entering an aircraft's receiver.

In an attempt to overcome this problem, the FAA is working on a Doppler VOR system, which is better suited for installation in poor terrain. Found to be as much as seven times less susceptible to scalloping error as conventional VOR transmitters, the Doppler-type ground installation has 50 VHF loop antennas located on the periphery of a 45-foot circular frame. The signal source is rotated from one to another of these antennas at a rate of 30 revolutions per second around the entire grouping. Another signal source is a VHF loop antenna located at the center-point of the antennas. The differences in cycle between the signal emitted by the central antenna and that of the grouping supplies an airborne VOR receiver with a reference signal which creates more accurate signal reception.

ONE of the most important features of the Doppler VOR system is that it is completely compatible with existing airborne VOR receivers. That is, a pilot wishing to take advantage of a Doppler VOR station need not have any special equipment installed; his regular omni receiver will do the job. The only changes necessary will be made by the FAA itself, in the ground transmitting stations.

There is a fully operational Doppler VOR transmitter being tested and perfected at NAFEC now. Another has been installed at Rikers Island in the New York area and is soon to be commissioned; a third is planned for the Los Angeles area in the near future.

Doppler VOR installations, which probably will gradually supplant the present VOR transmitters, will offer more reliable navigation on the Victor airways and in off-airways flying.

More and more of the nation's 600-odd VORs are being converted to VORTAC—

(Continued on page 68)

THE THRUST LEVER

By CAPTAIN DAVE KUHN

"The Toad Beneath the Harrow Knows
Exactly Where Each Tooth-Point Goes
But the Butterfly Upon the Road
Preaches Contentment to the Toad"

EIGHTY-FIVE HOURS in a jet will wear you slick. It lends itself to a steady job, real steady. Yet we get bales of literature from our representatives, telling us how good we got it. These good tidings are sent by people who have never tried it.

Since the jets were put into commercial operation about two years ago, there has been a sharp increase in crew ailments. Jet pilots who never had a sick day in their career are reporting off duty with colds, ruptured ulcers, palpitations, back ailments and pure fatigue. It is the grind.

Eighty-five hours per month may not seem like much work to the average citizen. Add to the 85 hours of actual time in the air some 50 hours of preparation and debriefing time, plus 65 hours (or more) at intermediate stations and over 100 hours at the other end, and it's easy to understand how a pilot gets to be a stranger at home.

Since the jets fly about twice as fast as the prop equipment, it follows that you must make about twice as many trips to get that 85 hours.

The FAA Administrator has been very active in safety matters. One member of the crew on jets must wear an oxygen mask above 25,000 feet. Age 60 is the limit for flying commercially. The captain and copilot eat different meals, prepared in different ovens. This will prevent them from having the same food poisoning. There is wishful hoping that the Administrator will take a look at reducing jet hours. He is fresh out of the Air Force, where 60 jet hours is a big month.

Management, while cognizant of the need, has cast a jaundiced eye at hourly reduction. They want something from the pilots in return. One major carrier has indicated a willingness to negotiate a reduction in jet hours with no loss in pay in exchange for the fourth man.

Thus far, our pilot leaders are looking out the window. They do not fly jets. We are told that it is impossible to get an hourly reduction. Yet our sister union, ALSSA, has negotiated a jet flight time reduction on several airlines. This with negative aid from the pilots. Foreign carriers who never had any limitations, are flying less than 70 hours in jets. Our leaders will look you in the eye and tell you that they represent all the pilots. One then must rationalize that jet crews are not part of the act.

A member of the wage policy committee, who flies DC-3s on a feeder line, stated that reducing the hours on jets would be direct featherbedding. He, as a policy maker, prefers duty rigs and gimmicks, called "pilot utilization formulae." This is where a pilot gets paid every time he suits up.

Pay and credit against the 85-hour concept would have little, if any, relation to how much productivity a pilot can show. All pilots know that some duty rigs are necessary to prevent scheduling abuses by management. Duty rigs were never designed to form a major part of the take-home pay. If this program is successfully negotiated (and it well may be), all pilots will get the same pay, the same time at home, with destruction of incentive.

A pilot flying 40 hours (with gimmicks) will get the same pay as one flying 85. The penalty runs will have great bidding allure. We are told that this approach is not featherbedding.

About 1933, Congress passed the National Labor Relations Act. It became known as the Wagner Labor Law and was the "Magna Charta" of organized labor. Decision 83 of this Act was for airline pilots. It established maximum hours and minimum pay. It set forth a base pay, hourly pay (with day and night differential) and mileage pay.

In 1946 the TWA pilots amended Decision 83 to include recognition of gross weight. It was the first strike and, although the pilots ended up with less cash than was offered, they established the added increment to round out a very effective method of measuring productivity. As the planes got faster and heavier, the wages automatically increased. (The hours had been set at a maximum at 85 in 1933, when all industry was working 60 hours per week.)

Subsequently, of course, the record shows that industry in general accepted hourly reduction as a legitimate bargaining item. Most labor unions have reduced their work week by some 33 per cent. But not so the pilot.

As the props give way to the jets, there will be fewer butterflies and more toads. The croaking complaints of the lacerated toads will demand attention. In the not too distant future there will be only toads. They will get relief—if they are not inured to the tooth-points. Here is one toad that will never get used to them.

Convair 540 Conversion with Napier Jet-Prop Engines

Convair 540s undergoing modification with Napier Jet-Prop engines at AiResearch Aviation Service, the most experienced company in the modification of pressurized aircraft.

AiResearch Aviation Service converts Convair 340s and 440s into high performance airliners and executive aircraft with Napier Jet-Prop engines specifically designed for the Convair 540.

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Installation of the 3500 eshp Napier "Eland 504" Jet-Prop engines with four-bladed propellers includes structural modification to engine nacelles, new instrumentation, and electronic and radio system modification in minimum down time.

Conversion of Convair 340s and 440s to Napier-powered Jet-Prop 540s is performed exclusively at AiResearch Aviation Service, the most experienced company in the modification of Convair 240s, 340s and 440s into executive aircraft and luxury airliners.

Employing more than 600 of the most highly trained and experienced engineers, technicians and craftsmen in the industry, AiResearch performs all design, engineering, fabrication and installation work in one location to meet the conversion, modification, maintenance and overhaul requirements of any aircraft.

Write, wire or telephone today for complete information regarding your Convair 540 conversion with Napier Jet-Prop engines.

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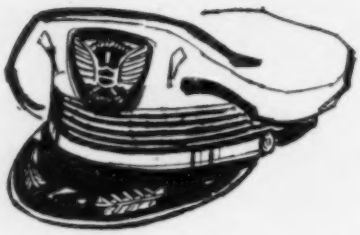

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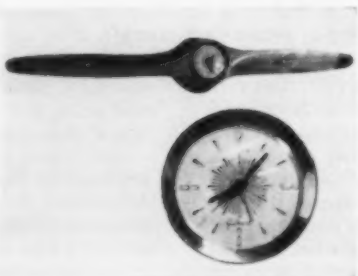
FLYING FINDS

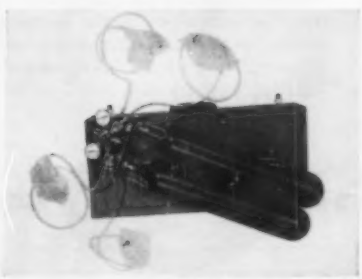
RECOMMENDED READING for student, or the pilot in need of a refresher course, is "Learning To Fly," by John Holland, an experienced instructor. In this book, the author places emphasis on how one flies an airplane rather than how it is mechanically manipulated, while skillfully presenting the latest lesson-by-lesson method of training along with a clear explanation of the fundamentals of flight. Holt, Rinehart and Winston, 383 Madison, New York 17, N. Y. Price, $5.

MAPS IN 3-D. Something for the entire family are the new relief maps of the U. S. and World. Of durable vinyl, framed and ready to hang, both show terrain in colors from copper brown to pale green. The new 50-state U. S. map contains over 4,000 geographic names; the World map, some 2,500. In three sizes: 28 x 18", $9.95; 41 x 26", $24.95; 61 x 42", $49.95—f.o.b. Philadelphia, Pa. Aero Service Corp., 210 E. Courtland St.



PROPELLER CLOCK. This is a handsome, useful gift for the airman's home, office, or den. The propeller is half size—42 inches long—of laminated clear maple with a high varnish. Mounted in the hub is a white-faced electric timepiece with bronze sweep second-hand and an alarm, encased by a five-inch chrome bezel ring. Complete with five-foot cord, price $19.50. Aircraft Components, Inc., Benton Harbor, Mich.

HIGH FLIGHT calls for oxygen equipment. Sky-Lyfe portable oxygen units, designed for all aircraft, come in five models with maximum of 15-hours supply and one- to six-person capacities. Model 2000-A shown here consists of two 300-liter cylinders manifolded together. With four quick-disconnect breathing outlets, offers up to 10-hours continuous flow (one person). Weight 20 pounds; size 8 x 26". Price, $189.50, Van Dusen Aircraft Supplies, Teterboro Airport, N. J.



FOR CHRISTMAS

This department is not composed of paid advertising. Items shown are believed to be good values. Companies listed guarantee immediate refund if you are not satisfied.

FLIGHT JACKET with a bonus, is this reversible jacket, sage green on one side, and survival orange on the other, in combed cotton Byrd cloth twill. Collar, cuffs and waistband are of all-wool rib knit. Both sides have zippered pockets, and the outer side a leather tab for the owner's name. With warm inter-liner, $24.50; without, $22.50. Give height, weight and chest size. Fruhauf Uniform Co., Dept. X, 312 E. English, Wichita, Kan.

"AIRMAN'S CREDENTIALS." Designed specifically for the on-the-go pilot and his (or her) collection of flight credentials and identification cards, this is a compact wallet in fine-grain cowhide. It provides eight double plastic windows and two inner pockets for easy reference. An accompanying leather bill clip, embossed with gold wings, is carried separately or in the case. In ginger color only, $5. PP., including taxes. Marion M. McIntire, P.O. Box 16, Woburn, Mass.

SOFT TOUCH. Expressly for the man who flies, these lightweight gloves (only 1¼ ounces) are smartly tailored of 100 per cent sheepskin and so amazingly pliable they offer no hindrance in manipulating the smallest of cockpit controls. Called Aero-Gloves they come in oyster white only; sizes small, medium and large. Soft on the pocketbook, too, at $4.95. Illini Enterprises, 1103 W. Healey St., Champaign, Ill.

SUN GLASSES, PERHAPS? Of top repute in this line is Bausch & Lomb of Rochester, N. Y. Their "Outdoorsman" is an all-purpose sun glass of fine-ground highest quality optical glass in flexible metal frames with riding bow temples. Large lens size, 58 x 50.5mm, is available with RayBan green top and double gradient density, G-15 neutral gray, or Kalichrome lenses (for sharpening detail in haze). Price, $16-$18 at leading optometrists, opticians, department stores.

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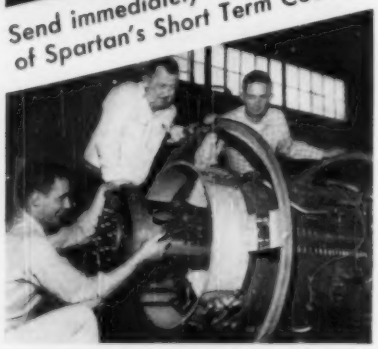

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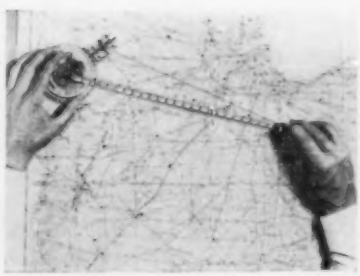
FLYING FINDS FOR CHRISTMAS

"WIND ON MY WINGS" is a book for the aviation corner of the library. Its author, Percy Knauth, in a most eloquent style tells the story of a dream become a reality—his dream of becoming a pilot and owning his own plane. This is the author's own story where one follows him step by step to his first solo and beyond to an exciting 25-hour trip across the Atlantic in a small plane. Doubleday & Co. ($3.95), 575 Madison Ave., New York.

ON THE RECORD. To master the Morse code and complexities of air traffic control clearances we offer "ATC Clears." The latest of four instructional Hi-Fi LP albums by Aero Products, Los Angeles, Calif., this record gives seven progressive code lessons on one side, 42 IFR clearances on the other. The price, $5.98. Others in this series are Instrument Flight, Tower Communications, On Course, On The Glide Path. Address: 10493 Santa Monica Blvd., Los Angeles.



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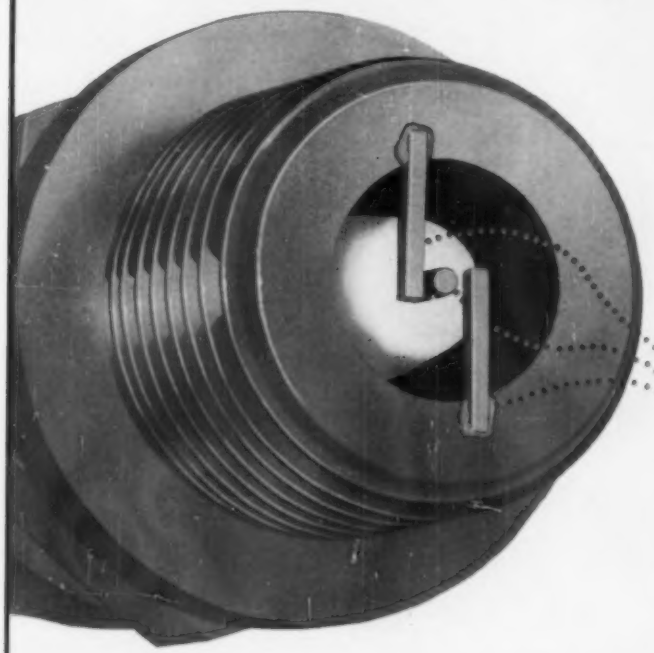

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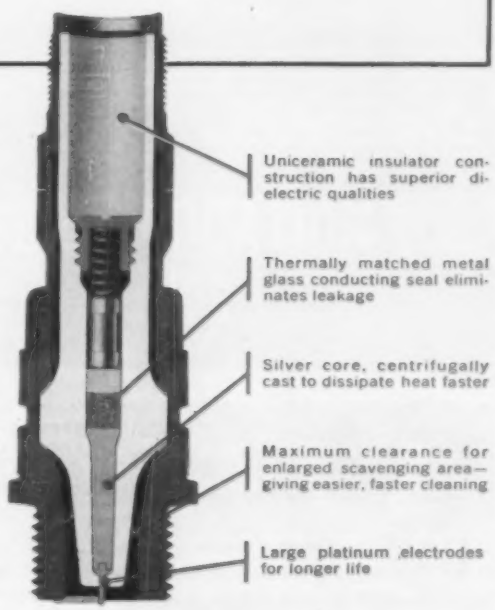
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(Continued from page 62)

which simply means that distance-measuring capability is being added to the original VOR transmission.

The unfortunate fact, however, is that there are very few aircraft flying—particularly in the general aviation category—that are equipped to take advantage of the distance-measuring facilities. The reason is simple. At the time of this writing, there is no FAA-approved, light-weight, low-cost DME receiver for use in general aviation aircraft.

There is an airline-type DME, made by ITT, but it weighs about 40 pounds and costs in the neighborhood of $5,000—hardly suitable for a Tri-Pacer or Bonanza. Some years ago, NARCO marketed a DME unit closer to the mark; but since then the type of transmission has been changed, and the old receivers can't handle VORTAC.

The FAA is hard at work to fill this need for DME equipment. Last year, it issued a contract to NARCO to develop a general aviation DME airborne transponder for testing and evaluation. The goal was to design a unit that would weigh less than 20 pounds, draw a minimum of electrical power and sell for $1,500 or $2,000.

LAST March, a successful flight was made at NAFEC, using the prototype General Aviation DME mounted in a Piper Apache. Although the installation wasn't as good as can be expected of a production model, solid distance-measuring capability was demonstrated for a full 100 nautical miles from the transmission site.

The first batch of sample units was recently delivered to NAFEC by the manufacturer and tests have begun. It is hoped that the testing program will be completed by mid-1961, and a U.S. standard for a general aviation DME unit issued shortly thereafter. This will allow NARCO and other manufacturers to begin marketing DME units that comply with the standard.

The advantages to pilots will be tremendous. A pilot flying a DME-equipped aircraft will know his ground speed at all times, as well as his distance-to-station; he'll be able to make far more accurate ETAs; IFR approaches will be simplified, with DME capability making possible straight-in let-downs from cruising altitude, and more holding points will be available.

Since 1947, there have been attempts to provide pilots with visual displays of their position, through development of various tracking devices that print an aircraft's course on a chart. Until recently, however, the government has made no attempt to investigate the effective use of such devices or to adopt an acceptable standard.

Work is now going on at NAFEC to "determine the operational value of, and evolve procedures for use with, pictorial displays as aids to air traffic control."

There are two approaches to the problem—the course-line computer and the so-called pictorial display itself. Both approaches use information derived from VORTAC receiving equipment. The course-line computer takes the bearing and distance information, triangulates it, and offers the resulting position data in the form of numerical readings on gauge-faces. The pictorial display takes the same information and translates it into a visual track of the flight path on a pre-printed chart.

Tests at NAFEC currently are being run on units developed by Avion, ACF Electronics, ITT, Butler and others. There are many problems involved in this work, such as: how much leeway for error must be allowed in terms of airways width and aircraft separation when using the pictorial displays; how to design pre-printed charts for approaches, departures and en-route flight segments, etc.

Emphasis is being placed, here too, on compactness, light weight and relatively low cost, with an eye to the needs of general aviation. The ITT unit, for example, is 14 inches square, two-and-a-half inches deep, and weighs about 15 pounds. The Avion unit's display head is only 6x6x4". It is hoped that some version of the pictorial display will eventually be marketed for as little as $1,000. (It must be understood that to make use of a pictorial display system, an aircraft must be equipped with VORTAC receiving equipment.)

The entire effort is being geared to providing pilots with an additional navigational aid, good particularly in VFR operations—although probably usable for IFR as well—which will make available new airways without the need to add new ground facilities.

NAFEC's recommendations on the competing systems it is testing should be ready by the end of 1961, and the FAA's standard adopted by mid-1962.

In addition to the major efforts covered in this survey, NAFEC engineers and scientists are engaged in a bewildering variety of projects, all important to some sphere of aviation's growth and development.

For example, a number of types of radar are being evolved under the auspices of the FAA's Bureau of Research and Development and tested at NAFEC. Only recently the huge antenna for a new Air Height Surveillance Radar was lifted into place at NAFEC. AHSR is designed to give air traffic controllers precise altitude information on all aircraft within a 50-mile radius, enabling them to separate the aircraft vertically without relying on pilots' altitude reports. A new air surveillance radar developed by Bendix for use as en-route or terminal ATC radar is undergoing evaluation. And another type of radar is being developed to facilitate ground control at busy air terminals.

A NUMBER of test programs in the field of collision-avoidance are being conducted at NAFEC. One involves the use of fluorescent paint as an aid to in-flight aircraft visibility. Another project is concerned with finding the most effective arrangement of navigation lights on planes in flight. As various organizations like Collins, Sperry and Bendix develop the "proximity warning indicators" and other anti-collision devices now on the drawing boards, these vital items will be fully explored at NAFEC before they are approved for general use by the FAA.

All in all, NAFEC's role is an important one. And, as the skies fill with increasing numbers of aircraft of every variety, calling for better control techniques, new communications systems and an entire spectrum of equipment and methods, NAFEC's job will become even more important to the continued growth of American aviation. END

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Know About Ice

(Continued from page 47)

volume of air space. The actual weight of all these droplets will vary from .1 to 5.0 grams of water per cubic meter of air.

In putting the chart (Fig. 1) to work assume a large droplet of .04 millimeter water content measured in a large cumulus. (This chart is set up for speeds of about 100 mph.) The calculated ice accretion is around one-quarter inch per minute, thus is not far out of line with the actual thickness. However, the chart must remain primarily a training aid, only illustrating the factors which determine the rate of ice formation.

CAN the intensity of ice be classified? The Weather Bureau judges the intensity only by how easy, or hard, the wing de-icers must work to clear the ice away. Their weather forecast is primarily in terms of airplanes in the DC-3 category and up. Some time ago Air Force research established a classification for use without wing de-icers and this may be of help in evaluating forecasts or pilot reports. Light icing was considered to exist up to three-sixteenths of an inch per five minutes. Moderate ice ranged from three-sixteenths to one-and-one-half inches per five minutes. Severe icing was an amount greater than one-and-one-half inches in five minutes.

Ice reduces lift and increases drag but a single statement fails to clear up the question. In wind tunnel tests a formation of one-half inch of ice, covering the first five per cent of the airfoil, reduced the maximum available lift to 54 per cent of normal. Imagine that something saws off one-half of each wing while you are flying along—but without reducing the drag created. Now the airplane exhibits the unsavory slow flight characteristics of a racing plane. Either an increase in power or of angle of attack is necessary to maintain altitude because of its loss of lift.

Now imagine further that the "something" which sawed the wings in half, now extends a briefcase out each window, holding them flat against the airstream. The airspeed indicator immediately reflects such a drag. Again, more power or angle of attack is needed to keep your altitude—but there is only so much power and angle of attack to use.

Occasionally, a very light accumulation of rime ice may form a narrow, sharp-edged bead along the leading edge. Though slight in appearance it has a profound effect on the stall speed. On some older aircraft the manufacturer placed a small triangular length of wood or metal along the leading edge near the wing root. This was called a stall strip and caused that part of the wing to stall first, at a higher airspeed than the outboard sections. A sharp-edged bead of ice along the leading edge is nothing more than a full-span stall strip and compells only shallow turns at an extra 10 to 15 mph in the traffic pattern.

Speed versus rate of ice accumulation is a highly controversial subject even among experienced pilots. Though the rate of accumulation is always higher at higher speeds, the total amount of accumulation may be greater at slower speed. For the

(Continued on page 72)

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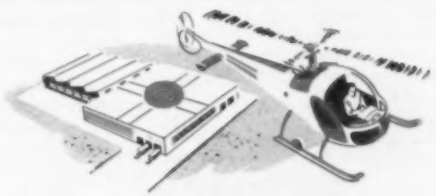

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(Continued from page 70)

average private aircraft there are few advantages in deliberately slowing below normal cruise. A reduction in speed calls for a reduction in power which brings an undesirable reduction in carburetor air heat.

With a fixed-pitch prop the engine rpm is lower and prop icing seems to be greater at lower rpm. At high angles of attack, ice will accumulate under the wing. A Navy recommendation calls for an increase over normal climb speed in icing conditions.

At *very* high speed the situation is reversed. Skin friction, or aerodynamic heating, prevents the formation of ice, and will melt ice previously deposited. This is why jet aircraft do not carry structural anti-ice equipment. Unfortunately, prop aircraft get little benefit from aerodynamic heating. Canadian tests showed this heat rise in icing clouds is insignificant until a speed of 275 mph is reached.

MORE applicable to our problem, there is a minimum standard of *emergency* ice protection for IFR pilots. This is the "life belt" idea for the pilot who firmly resolves not to take off into known icing but who wisely realizes that he may encounter icing conditions. If he gets into icing conditions he should benefit from these preflight precautions and flying rules:

- Always visit the flight service station or weather office whenever ice is even a remote possibility. A phone call is not an adequate weather briefing.
- Climatology is a subject within itself but, in brief, stay away from cloudy, windward slopes of mountains. Turbulence there produces severe icing as do winter cold fronts, even though they are not generally as violent as their summer cousins. Warm fronts with extensive, moisture-heavy cloud systems, make for extended flight in icing conditions and consequent heavy ice accumulation.

When the aircraft itself is concerned, the first rule is:

- Keep the engine running. This requires some pre-checking. Take a long, hard look at the construction and condition of the carburetor air heater. Heated air may be slipping through worn joints, robbing the engine. Heat-retaining material covering important sections, may be missing. This was the direct accident cause in two icing situations where the planes were otherwise well-equipped multi-engine models. In each case, one engine could not be kept running due to insufficient hot air.

Check the condition of fuel-tank vents and note their type. Some older aircraft have vents which stick up out of the cap or tank and point forward into the airstream. It does not happen often but the same ice which blocks an unheated pitot tube also can build on these vents. If they become completely blocked a partial vacuum is formed in the tank and no fuel flows to the engine. (Shift to another tank —it may not be completely plugged.)

- If the only source of power for gyro instruments is external venturi tubes they should be mounted in line with the exhaust stack or as close to the exhaust flow as possible. Long ago the old timers found exhaust heat of assistance in de-icing venturi tubes. Many aircraft which have had gyros installed during the past several years, carry the venturis well away from the exhaust stacks.
- A clean, smooth surface will pick up less ice than a dirty, rough one. Physical or aerodynamic uncleanliness presents a greater surface area to catch freezing droplets. Mud spatters under wings, fuselage, and on tail surfaces are good handholds for ice, as are the remains of insects along the leading edges. Rain won't always wash them entirely away.
- Remember that reduced payload can be used as anti-icing equipment, especially in areas where minimum en route altitudes are above 7,000 feet. Unsupercharged engines develop only about 75 per cent of sea-level power at that altitude, about 65 per cent at 10,000 feet. If there is a possibility of ice, leave one seat empty or take minimum baggage. Or wait until the weather odds are positively in your favor.
- An obvious but easily overlooked item is a free air temperature gage in good condition.
- When the full extent of an ice load is not known, keep power on and airspeed high. Flaps on some aircraft are primarily drag devices and lowering them may even cause instability due to unknown airflow changes over the iced-up surfaces. A retractable landing gear is not lowered until the last possible second if high power is needed to maintain altitude.

So far this "emergency" anti-ice protection has not involved much more than a check of existing equipment. Within reason what special equipment can be purchased?

A heated pitot tube is a boon although it is not standard equipment in the low-priced field and must be purchased from an aviation supply house. Currently, they are advertised for around five dollars. Installation and approval of the heated pitot involves problems but they can be solved.

Pitot ice can render useless the airspeed indicator, forcing trust in the gyro horizon and altimeter for nose position and power setting for approximate airspeed. The loss of the airspeed indicator is like the loss of an eye. All former control measurements become useless. Ice may raise the stall speed—but how much? It destroys stall warning characteristics. The clean wing would stall at around 16-18 degrees. Ice has cut this in half.

TO climb is to ease the wheel back a notch and to hold it there, then wait for the altimeter or rate-of-climb to move. For faster climb, another notch, and wait. Even standard-rate turns may result in a stall due to accumulated ice and the increased stalling speed.

If the altimeter and climb indicator receive pressure from the pitot tube their fate would be the same as the airspeed. This is "blind" flying with nothing to tell you "how high" or "how fast."

So the change to a heated pitot tube is a bigger jump into emergency ice protection than is indicated by the slight apparent improvement. You get away from that helpless "pipe in the wind," so susceptible to rain and ice. The airspeed needle points with authority and there is no hesitation in accepting its opinion.

Next, is "emergency" prop anti-icing.

(Continued on page 74)

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(Continued from page 72)

"On several occasions when wing de-icer equipment failed but prop anti-icing equipment continued to work," said one airline pilot, "the load of ice which would be carried was much heavier than expected. Loss of effective horsepower is of *major* importance compared to either wing distortion or added weight."

This brings up the question of anti-ice compounds. What kinds? How effective are they? How do they work?

Commercial anti-ice compounds now on the market can keep the prop operating efficiently and, also, protect wing and tails. The various compounds are essentially the same in that their main function is to reduce the adhesion of ice to the aircraft surface. Each shedding of ice takes a microscopic amount of the compound with it and, after an interval of time, a reapplication on the surface is required. An FAA bulletin notes that a surface treated with such compounds will remain free of any serious ice buildup for a reasonable period.

What is a "reasonable" length of time? Effective protection has been obtained for more than several hours in light icing, but why be a hog? For emergency use count on one hour in light icing.

The experiences of several professional pilots with the compounds are worth quoting: "When I took off, the field had a 2,000-foot ceiling and a surface temperature of 30 degrees F. I wanted to take advantage of tailwinds at altitude so I sprayed Ice Repellent all over and went. I got ice on the windshield and struts, and lost the airspeed (unheated pitot), but there was no ice where the Ice Repellent was."

Another pilot, using a different product said, "I use Icex for prop de-icing on the company Apache. It remains there for at least 10 to 15 hours flying time, even if a lot of precipitation is encountered."

Ice Repellent is recommended for use directly on metal and painted surfaces. After ice or heavy precipitation is encountered it should be reapplied. Icex, the other product in general use, was originally intended to aid rubber de-icers in removing stubborn build-ups from leading edges. Its use directly on metal or fabric is secondary, however effective it may be.

(Icex is manufactured by B. F. Goodrich Co. The Glidden Co. manufactures #17-A Ice Repellent.)

Airspeed gradually erodes the protective compounds and reapplication should be made at regular intervals, on the props after every 15 flight hours, and after 50 flight hours on other surfaces. These figures are general.

Actually, there is no such thing as a "minimum" standard for anti-icing equipment. Each piece of equipment protects a vital part of an aircraft and it is unhealthy to think that the last item on a checklist is the least important and can be eliminated.

The more experience with ice, the more one is inclined to enter icing conditions with caution and a positive alternative course of action mapped out. Years ago a senior airline pilot flying western routes stated the choice very clearly: "To have turned back as the result of mature judgment is of more credit to a pilot than to have 'gotten through' with luck." END

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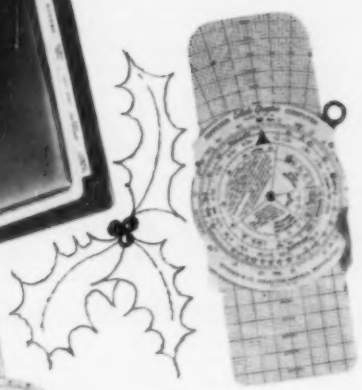

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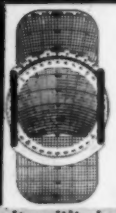

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HANGAR FLYING

CHAIN OF EVENTS

MY WIFE and I love to fly and do so at every opportunity. We have had our share of the unexpected, and after each "surprise," have tried to install some new equipment in the plane so that the unexpected could never happen to us again. Our aircraft is a Beech Bonanza; we are both 50 years of age.

We have a married daughter in Reno, Nev. and another daughter, with a family, in Salt Lake City, Utah. Every week end, weather permitting, we fly to Salt Lake City and the following week end is spent in Reno. As a result, we know every peak and side road between here and there.

This particular day I was tied up in the store and was unable to go to the airport to gas up the plane. However, I called the airport and asked to have the plane gassed and the oil brought up to level. Meantime, my wife Peggy went home to pack. I closed the store at 5:30 p.m., stopped by the house to pick up Peggy, the clothes and groceries she was bringing to the kids, pulled alongside of the plane and started loading. I put all the groceries--which consisted of eight pounds of coffee in addition to other items--in the back seat.

We taxied to the warmup strip and I went through the check list, looked for traffic, rolled onto the runway and took off, climbing to 4,500 feet. I called the Stockton Radio for weather to VFR to Salt Lake City at 14,000 feet, and put the plane into a steady climb.

Just as we reached 8,000 feet things started to happen. There was a loud noise --like skin tearing loose. We looked around the plane and everything seemed normal, then it happened again. I leveled off and decided we had better land. Then there were five explosions! The plane acted normally and everything was ok on the panel. Peggy crawled over the front seat and started checking. After a few minutes, she discovered that the coffee cans had exploded. We continued toward Lake Tahoe, pulling up to 14,000 feet where we put on our oxygen masks, relaxed and laughed at the scare the coffee cans had given us.

Thirty minutes later, over Carsons Sink, smoke appeared in the cabin. I called Battle Mountain Radio, explained our condition and started to let down. When we reached 9,000 feet I turned off the cabin heater and the smoke stopped. I continued over Battle Mountain and decided to go on to Elko where there was an A&P. We landed in Elko and had the mechanic check the ship.

The only thing he could find was that oil had overflowed onto the exhaust stack and that caused the smoke. We took off from Elko and headed up the valley for Wells, Nev. Just before we reached Wells I pulled the cabin heater on and the smoke started again.

I made a straight-in at Wells and pulled up in front of the gas pump house, opened the hood and checked the engine. I found a red oil-soaked rag on the heater for the cabin, and a pair of side cutters! Everytime I would pull the cabin heat on the smoke from the rag would go into the cabin; when it was closed the smoke would go out the bottom of the cowling.

I was disgusted by then for not checking the plane after the new engine had been installed. One A&P forgot the rag and side cutters and the second one missed them at Elko. I had just finished fastening the hood back into place when a fellow from downtown drove up and wanted to know if we wanted gas, so in order not to have him make a dry run, we filled up and started on our way to SLC. The field lights were on and it was quite dark by the time we took off.

In the air over Wendover, I called the Bonneville Radio and asked the time on our ETA be extended for 30 minutes, as we were leaving Wendover. Over Skull Valley, I called the Salt Lake Radio, gave them our position and asked to cancel our flight plan. Over Salt Air I called the Salt Lake tower. They cleared us to runway 16L into the pattern and to call on the downwind, which we did.

On base I started to throttle back and change the pitch on the prop but nothing happened. The mp fell off and so did the rpm. I called the tower which cleared me for a straight-in approach, landed and pulled in front of Kemp and Kelsey hangars --nearly hitting another plane as my brakes had failed. The following day I was at the airport bright and early to see what was causing all this bad luck.

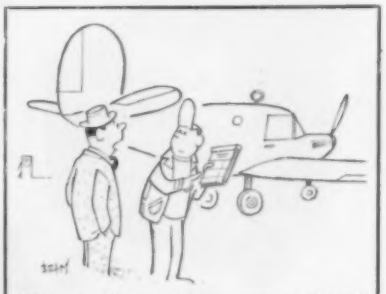
The pin in the prop gear box had not been fastened in by the set screw which was missing. It never had been installed when the engine was replaced.

There was a crack in the hydraulic brake line at the valve behind the engine which allowed all the brake fluid to leak out.

I had my day with the company who replaced the engine and relicensed my plane. I have since arrived at one conclusion, that the only way to have anything done on your airplane is to check it yourself after it is finished.

JOHN RUSH

Modesto, Calif.



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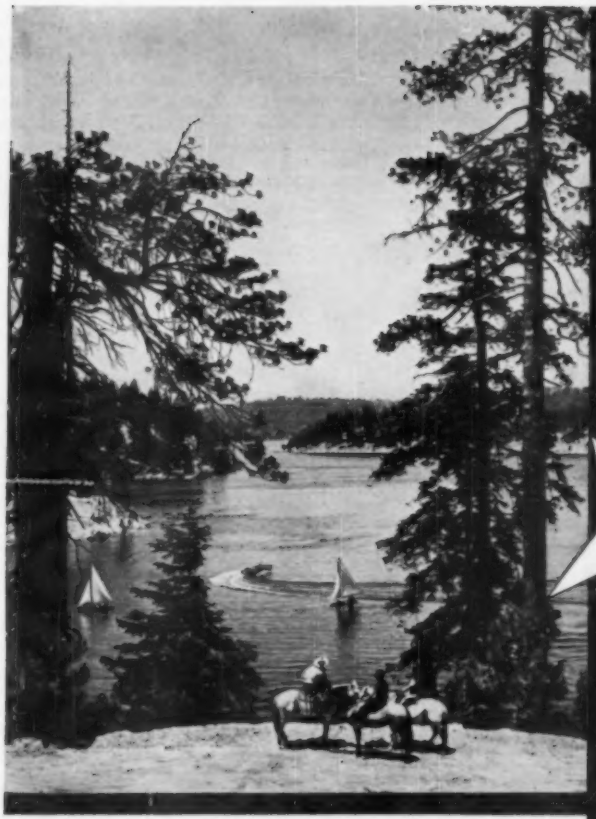

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More Ports

(Continued from page 35)

hundred small airports may remain uncounted, analysis is not easy. We simply know that the total has more than tripled since World War II when less than 2,000 fields were open to civilian flying. On the hope that hundreds of thousands of lightplanes soon would fill the air, a boom began, aided by GI training money.

When the GI dollars ran out, local flight operators were in distress. Housing demands made fields easy to sell and hard to buy. So the mortality, in private more than the publicly owned airports, offset new construction for net losses in the 1950s.

As the trend reverses, more than 10,000 of the nation's incorporated towns and cities still are without landing places. Time is running out, in many areas, to provide for the future of business flying.

In the 23 cities now classed as "large hubs," it is obvious that only skilled pilots with fully instrumented planes can land on the main terminals. This will be true in some of the 38 cities now "medium hubs" —ultimately in some of the 93 now "small hubs."

Pure jets will be serving some 40 cities within 10 years. Fast turboprops already are commonplace at hundreds of points. The slower planes and amateur pilots of general aviation must have separate facilities in the heavy traffic areas.

As an example of good planning, the airport authority for the Twin Cities complex of Minneapolis and St. Paul runs one airline terminal and several fields for general aviation. A business flyer can land near any part of the area he wants to visit.

For successful teamwork between public and private enterprise, the recent opening of the Montgomery County Airport, on the Maryland outskirts of Washington, sets a hopeful precedent. The land owners deeded the site to the county and operate the field under contract.

Adjacent land was re-zoned "commercial" so the owners stand to profit from rising values as the airport attracts progressive industry. There was a long fight by citizens who wanted neither the airport nor the re-zoning. But teamwork won.

In less congested areas, joint use of airports by airlines and general aviation may suffice, as far into the future as may be foreseen. Of more than 600 U. S. points certified for airline stops, nearly half are off the trunkline routes, served only by local transport airlines, in some cases only once a day.

Where traffic is heavier, one solution is to lay parallel runways where private planes can land without entering the airline approach pattern.

In some cities where airports have been outgrown and new ones built for airline use, the old fields remain for business flying. This may be the fate even of New York's once mighty La Guardia.

For cities off the airline networks, the hope that a business flying field will become a scheduled stop may be dim. Local service planes, half empty, are eating subsidy as they pioneer thin traffic areas. CAB will be slow in adding more.

Here and in the rural areas, the case for more airports must be made on the utility of business and personal flying.

Congress will take a new look at the needs in 1961, when the Federal Airport Act expires June 30. (It really is finished now.) Most of the money is allocated.

The federal share, matched by state and local funds, has run at $63 million a year. In the last fiscal year, when 314 airports were aided, some $15 million of the federal money went to 127 general aviation fields without scheduled service; the rest to airline points.

The present Administration has concentrated funds, inadequate at best, on the air transport system, largely through runway extensions, taxiways, and ramps on existing

(Continued on page 80)

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(Continued from page 78)

large fields. Budget policies have kept the Federal Aviation Agency from declaring for a further program.

Civil aviation groups most concerned have had to assert leadership. The Airport Operators Council, American Association of Airport Executives, and National Association of State Aviation Officials have combined in a nation-wide survey. (See October FLYING, "Who Speaks for You in Washington," on how these and other organizations work together.)

The survey will indicate the total funds needed for land acquisition, landing areas, and terminal areas. This will include general aviation as well as airlines.

Airport men stress the need for a national system of airports as envisioned in the original Civil Aeronautics Act of 1938, rather than a patchwork of projects locally conceived. More research and development is urged as to airport configuration, location of fields with respect to each other, parallel runways, and high-speed turnoffs—all for operating capacity—to keep pace with airways capacity on which vast sums are being spent.

Air traffic in the past year has not increased as fast as expected. Pressure for hasty action should be eased so there will be a little time to look ahead.

In the new airport plan, we can hope to see a priority list of a hundred or more cities that need action for the future of business flying.

Meanwhile, some of the states are granting airport appropriations out of general funds. Communities, often more from faith in the future of aviation than from present need, are risking money.

In Idaho, the state commissioner whoops up enthusiasm and bulldozes local strips in a single day.

Nobody seems to think much about what may happen if improved planes, with shorter takeoff and landing rolls, require less space in the future. If this happens, any land that is left surplus around airports can be a commercial asset.

If you are building an airport, FAA should be advised on Form 117. Next year, under a new airport plan and program, it may be hoped that we will have a full inventory and some idea of the most urgent projects that must be undertaken while there still is time.

You can help by working with the established groups to expedite local plans and to see that your field, if it qualifies, is on the nation's "most wanted" list. END

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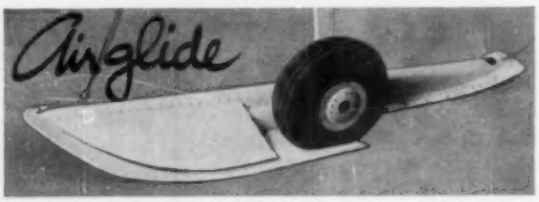

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I Learned About Flying

(Continued from page 60)

my belt, looked the terrain over carefully, and went in.

Crabbing sharply into the wind, we slid across the beach, the dunes and the marshland toward where the land became level and the runway began. N-3610-Zebra was a lively airplane that morning, and I had trouble keeping the airspeed down as we bounced and bucketed in the billowing gusts. I eased her over a large pile of sand beside the creek bed, straightened her out and then, just short of the runway, put her left wing down and cut the power. I don't think we floated an inch, for at that moment the wind caught its breath, so to speak, the gusts receded, and like a ship sliding down the crest of a wave into the trough we sank toward the ground. I pulled back hard.

The left wheel hit, and then we were rolling and rumbling over the bumpy but solid earth while I hauled on the brake with a shaking hand.

All through my cup of coffee in a nearby restaurant during the next half-hour, part of my mind was working on the takeoff that now had to come. It wasn't that I was worried, actually, but I was concerned. While my son, Philip, talked enthusiastically about his summer activities, I couldn't keep my eyes off the trees outside, trying to judge what the wind was doing. Every now and then the branches would stop swaying and my hopes would rise, but then a new gust would set everything in commotion and the little knot in my stomach tightened up again. I was beginning to realize that a real short field is far different from the imaginary one that the instructor tries to create before your eyes when he is readying you for your flight test. It's all right to hang an airplane on its prop when there is still half a mile of runway ahead of you—but what is it like when there are trees, real trees, instead? We soon were to find out.

Out on the field again, I studied the situation while Philip stowed his luggage. The wind was still northwest, 45 degrees or more to the runway. If it had been at right angles, I could have made my takeoff to the south, toward the low ground and the Sound. Should I do it anyway? No, I couldn't risk it; no matter how I positioned myself I would be going downwind too much. It had to be toward the north, toward the wires, toward the trees. I would get some help from the wind that way; I could even angle my takeoff run across the width of the field so as to get as much help as possible. Griswold is wide enough for that—but I would still have my hands full.

We climbed in, started up and as we taxied down to the southeast corner of the field I checked things carefully. The Tri-Pacer had a good engine; none of its 160 horses would be loafing on the job, so I knew we would be all right in that department. As for the flying, I planned to hold the brake until we had full power, then let her go with full flaps. Really, I said to myself, we ought to rise in short order that way.

We turned into the wind, I ran the engine up, checked magnetos, carburetor heat

and engine instruments, then swung in a slow circle checking the sky. Nothing coming in; only blue sky and fluffy, snow-white clouds up there. We maneuvered as far as we possibly could into the corner of the field; then I pulled on the flaps, held the brake, shoved in the throttle and, as she roared to life, let go.

The trees at the other end of the field were small and far away. The wind sock snapped at the top of its high pole next to the operations shack. My mind departed from the airplane, reaching out ahead over the hummocky field, feeling the wind, wishing us into the air.

We rolled and rumbled for an eternity. My right hand was on the throttle, doing its level best to push it through the fire wall, but we just weren't picking up speed. Was everything all right? Had I left the carburetor heat on? No, I could see nothing wrong; yet the airspeed seemed paralyzed. It crept to 40, hung there, crawled on to 45 and still we rumbled on and on.

Now, at last, the wind was beginning to take her, seizing the wings in billowing surges. Blow, wind, blow! I held the wheel over into it, not daring yet to bring it back, and watched the trees get bigger.

At what point should one abort a takeoff? I didn't know, but we were up to 50 now and it seemed inconceivable that we would not get into the air. It had never happened before; was this the time? My mind grew cold as ice; every nerve in me strained to sense that moment when she would fly, reaching ahead to feel the wind, to judge the distance left.

It was too late now. We had reached "V_2," I knew, that mathematical point I had read about in books where you *had* to fly, where you were committed absolutely to the air. My eye caught the airspeed. Fifty-five! Sixty! My fingers longed to pull the wheel back, to get her off the ground, but my mind said no. Not yet, not yet! I knew I would have to jump her off and we needed all the speed we could get. The trees looked like the high Sierras now, swaying and rippling in the wind.

SIXTY-FIVE! Now is the time! I eased her back; she leaped into the air, as grateful as I was for her freedom. The trees rushed toward us, a green wall. Just to the left they ended; there stood the operations shack and the wind sock, flogging back and forth on its tall pole. As if by instinct, 10-Zebra made the slightest turn, easing toward the gap. Perhaps it was a vagary of the wind, a dying gust: she put her left wing down a hair, her right wing up; we were level with the trees now, the topmost branches reached for the wing—and failed. On my left, I saw the wind sock flick by just beyond the wingtip. Then the wind took us, and we soared.

At Montauk, 20 minutes later, the wind was still blowing at exactly right angles to the runway. We made a textbook landing on the right wheel, floating in quietly across the dunes; after that takeoff, it was easy.

Back at the summer cottage in Amagansett, I asked Philip with studied casualness: "How did you like that takeoff?"

"Boy!" he said. "I was pushing up on my seat all the way! It looked kind of close to me!"

(Continued on page 84)

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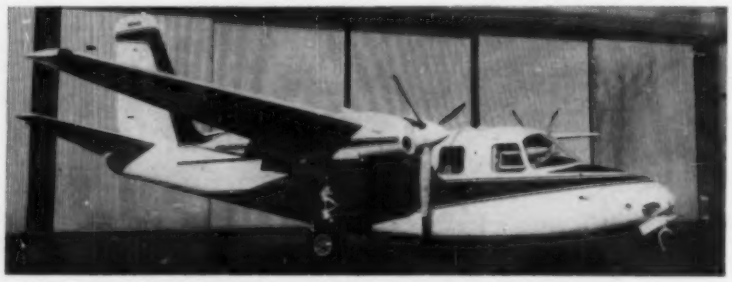


COMMANDER 680F RECORD BREAKER

AERO COMMANDER 680F, embodying design refinements plus five years' experience accrued from the company's original supercharged 680E, has gained significantly in performance while adding 1,000 pounds to maximum takeoff gross weight (8,000 pounds).

Aircraft N6139X was flown by FLYING following its setting—with Miss Jerrie Cobb at the controls—a new world altitude record of 37,010 feet (in one hour and 49 minutes), bettering the old mark of 34,862 feet. Powerplants for the 680F are two Lycoming IGSO-540-B1A developing 380 hp each at 3,400 rpm for takeoff, and incorporating fuel injection.

Aileron and elevator forces on the 680F are minimal, yet not so light they tend to induce overcontrol. Rudder forces are, proportionally, slightly higher (than aileron or elevator) for any given maneuver, a function of the airplane's high speed and power, but within normal acceptable range.

The airplane has a high degree of inherent stability. Rudder tab adjustments required are very minute. The 680F trims out well for hands-off flight in all regimes.

Specifications call for maximum speed at 15,500 feet of 290 mph, a cruise speed at 10,000 feet (70 per cent power) of 244 mph, a maximum speed at sea level of 255 mph. Fuel capacity is 223 gals., service ceiling (two engines) is 28,500 feet, initial rate of climb is 1,660 fpm. Useful load is 3,200 pounds.

Hot-day sampling by FLYING, with outside ground temperature 81 degrees F and with six aboard, including Emmett R. Morris, 680F project manager, showed these capabilities:

During ascent at normal climb power—87 per cent horsepower—the airplane, indicating 155 mph, passed through 2,500 feet ascending 1,100 fpm; through 4,500 feet climbing at 1,200 fpm. At 5,500 feet, climbing, airspeed was increased to 180 mph indicated, where rate of climb held 800 fpm. At an indicated 190 mph, the 680F ascended 800 fpm, hands off.

Normal climb usually is 160 mph, best for a good forward speed and good climb angle. Best climb speed (for fast altitude gain) is 120 mph.

At 10,000 feet, with outside air temperature 50 degrees F, and pulling 65 per cent power (31 in. mp and 2,600 rpm) the airplane indicated 200 mph for a true airspeed of 238 mph. At 70 per cent power, same altitude, indicated speed was 212 mph (again hands off) for a true reading of 253 mph.

Cockpit visibility is quite good, as is noise level; ease of conversation was apparent to all aboard. The high-speed airplane was brought down pulling 30 in. mp and 2,500 rpm, descending at 2,500 fpm at an indicated speed of 270 mph.

Deliberately high approach was made where, with runway disappearing under nose, the 680F made a high-angle descent from 1,000 feet. Good flare-out was accomplished with a power-off approach, easily making first third of the runway. It would be difficult to overshoot in the 680F.

(Continued from page 83)

"Well," I said, "I guess it was close, but it wasn't really critical. After all, with 6,100 feet of runway there ought to be plenty to spare." But I was remembering, and I started to shake all over again.

My wife chimed in. "What are you talking about?" she asked. "What was the matter with your takeoff?"

"Oh," I said, "it wasn't all that bad, really. But you see, Griswold is kind of a short field, only 1,600 feet, and there were those trees . . ." And I told her the story.

We had a friend staying with us, a friend who likes to be precise about details. "If the field is 1,600 feet long," June asked, "how much do you need to get into the air?"

My gosh, I had never thought of that! I had just taken it for granted that any field marked on the charts as an airport is big enough for a small plane, even if some are shorter than others. "Let's see, now," I said, trying to recall those once so well known figures. "I think it's about 900 feet. I could look it up when we get back home—no, wait a minute! I've got the manual right here in my flight kit!"

And so I did; I always had it with me, ever since I bought it two years before to study the Tri-Pacer when I started flying. I got it out and we all bent over the pages. There it was written as plainly as only figures can tell:

"Takeoff over 50-foot barrier (ft.) . . . 1,480 with flaps extended."

"By golly," I said, "we had 120 feet to spare." END

Bell's 204B

(Continued from page 39)

applied. Through the 135-145 mph range vibration increased but at no point was there any lack of controlability.

The onset of blade stall in the semi-rigid seesaw main rotor is clearly defined through an increase in cyclic and collective feedback, and is not violent. Recovery is accomplished by reducing collective pitch and reducing air speed.

During landing there is no vibration in the transition from forward to hovering flight, allowing the pilot maximum control until set-down is accomplished. Due to the immediate reaction of all systems there is a tendency to over-control the touch-down.

Sideward and rearward flight, and turns on-a-spot from a hover, were made close to the ground. At no point were the power or control limits approached, leaving a very favorable impression of the 204B's handling characteristics.

BELL RECORDS SET BY ARMY

Climb to 3,000 meters (9,843 feet): 3:22.4 minutes

Climb to 6,000 meters (19,686 feet): 8:10.2 minutes

Nonstop distance, closed circuit: 441.74 miles

Speed run, 3 kilometers (1.864 miles): 158.05 mph

Speed run, 100 kilometers (62.14 miles): 142.2 mph

Speed run, 500 kilometers (310.69 miles): 148.45 mph

Speed run, 500 kilometers (310.69 miles): 148.45 mph

Tests were run under the supervision of the National Aeronautic Association in July of this year. Certification is pending from NAA and Federation Aeronautique Internationale.

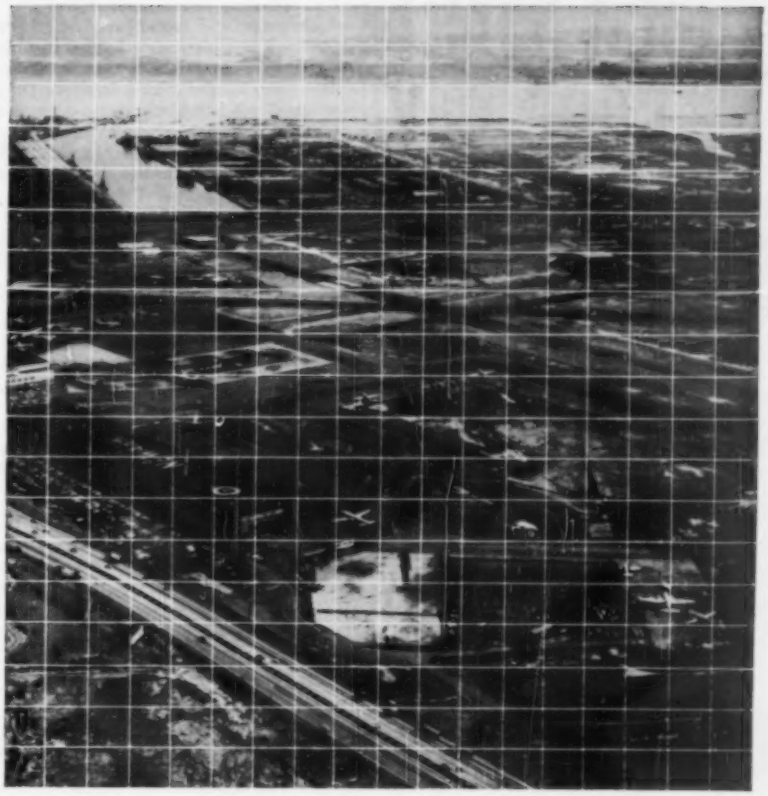
A simulated engine failure completed the evaluation. Starting at 1,000 feet the rotor was disengaged by lowering the collective and retarding the throttle to the detent. (The detent prohibits inadvertent shutting down of the engine.)

At an airspeed of 65 mph, 1,650 rpm rate of descent, and a 300 rotor rpm, the 204B handled as well as in powered flight. Going through 100 feet a slight flare was executed and accentuated at 40 feet. The rate of descent was checked as collective pitch was brought in and the laterally mounted skids touched at 15 kts. Collective must be lowered slowly once contact with the ground is made to avoid an abrupt stop when carrying forward speed.

The favorable performance with the 860-hp L-1 indicated that, with the new and higher-powered L-9 installed, the helicopter will exceed the limitations set on it by Bell.

The 204B's interior was designed by Horton and Horton, who also will customize production models to suit individual demands. Tinted windows, fine fabrics,

(Continued on page 86)



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(Continued from page 85)

thick carpeting and sound proofing add to the decor. Fresh-air scoops keep the cabin comfortable. Friction knobs allow windows to slide open on the pilot's, copilot's (and passenger) compartments; access doors can be positioned up and down as desired.

The 10 upholstered seats in the 140-cubic-foot cabin are installed in rows of five, three, and one parallel to the pilot's seat. The two forward seats, at either side of the center pedestal, are three-way comfort adjustable, and are provided with swing-down arm rests.

Instrumentation, including dual all-weather navigation aids, and switches are located for the convenience of both the pilot and copilot. An overhead console carries the DC circuit-breaker panels, all interior and exterior lighting switches, a cargo release, cabin heater, and AC and DC power controls. The center pedestal featured an all-weather Aircraft Radio Corp. Radio package plus a Sperry navigation compass and a Lear attitude system.

IN looking at the 204B from an engineering point of view, the compact design of the fuselage with its large sliding doors facilitates the loading of passengers and, with the seats removed, the handling of bulky cargo. Due to the placement of the center of gravity and small amount of CG travel (13 inches), cabin loading requires no special ballast arrangement.

While the evaluation was not flown with the helicopter in its cargo configuration for use of the external sling (designed to carry up to 4,182 pounds), the sling's location at the longitudinal, lateral, and vertical CG tends to substantiate Bell's claim that cargo flying is both easy and safe by "eliminating in-flight load oscillation feedback."

The 204B is currently in the process of going from 300 to the 500 hours life on its component parts. By mid-1961, before any commercial deliveries are anticipated, Bell expects to have the base time for overhaul at 1,000-hour period with other components, such as the rotor shaft, rated up to "infinite life."

THE main rotor blades are constructed around a completely extruded spar. Brass and tungsten under a stainless-steel leading edge make up the blade forward of the spar. Aft is an aluminum honeycomb. There are no rivets in the blades. A chemical adhesion bonded under heat and pressure, with additional bonded layers of dural at the attachment points, give these interchangeable blades an overhaul life of 2,500 hours.

Engineered for rapid maintenance, the carefully planned engine-and-accessories section is located just aft of the cabin area. The hinged cowling swings easily, yet securely, out of the way, allowing all components to be work-accessible in a matter of seconds; attachments to the powerplant are by quick-disconnects.

All maintenance can be performed from the ground or from the built-in work platforms at either side of the turbine—forward near the main rotor shaft. Only five special tools are required on the 204B for organizational maintenance. One of these, an engine hoist, is included with other standard equipment as an in-the-field aid.

The military, for instance, have performed a complete engine change in 20 minutes, a transmission change in 40 minutes, a battery removal and replacement in five minutes and the main generator in 10 minutes.

Under the present set-up engine overhaul will be done through Lycoming; the other components by Bell. END

BELL MODEL 204B

Weights:	Passenger Configuration	Cargo Configuration
Gross weight	6,500 pounds	8,500 pounds
Useful load	2,182 pounds	4,182 pounds
Weight empty	4,318 pounds	4,318 pounds

Performance:		
High speed at sea level, Vne	147	mph
Cruising speed (best range at 6,000 ft. alt.)	126	mph
Maximum rate of climb	2,660	ft./min.
Hovering ceiling (In ground effect, std. day)	17,600	feet
Hovering ceiling (Out ground effect, std. day)	13,000	feet
Fuel consumption (cruising)	73	gal./hr.
Range (std. fuel supply, 155 gal. with 10% fuel reserve)*	260	statute miles
Endurance (with 10% fuel reserve)*	2.8	hours

* Performance computation is based on passenger configuration

Specifications:

Seating capacity: pilot and up to nine passengers.
Litter capacity: pilot, medical attendant and three litters.
Internal cargo: 140 cubic feet, up to 3,000 pounds capacity.
External sling load: 4,000 pounds capacity.

Engine:

Lycoming T53-L-9
Ratings: 1,100 shp at 6,400 rpm (takeoff) and
960 shp at 6,400 rpm (maximum continuous).

Eagle with One Wing

(Continued from page 53)

down one of Charlie Jensen's 300-horsepower Travel Air dusters after sulphuring a Lodi vineyard, got out to inspect the engine mount, when the dead engine kicked over freakishly just once and the big prop clubbed him fore and aft, knocking him 40 feet into the dirt.

His entire right side was smashed, front and back. His ribs were broken, collar bone shattered, shoulder blade splintered. His shoulder socket was crushed. His right arm was nearly severed at the elbow and had to be taken off at the shoulder.

They hauled him to San Francisco, took off his mangled arm, gave him 16 pints of blood, and told the Joses to pray. They prayed up a near miracle.

MIKE first had a life to rebuild, with one hand. He went to school to learn to sell real estate and insurance, and did well—had his own company going in a couple of years, and started making a few bucks. But he couldn't get over a grounded airman's worst ailment, itchy wing-roots.

"I was around airports and pilots all the time," Mike says.

"At Buchanan Field in Concord one hot day with Harry Alley, an old-time flying buddy, I was grumbling about having to drive the 60-odd miles to Sacramento. Harry looked up and said, 'Take the BT, Mike,' as though he didn't know that was the million-dollar question: Did I have enough guts to fly or was I all through?"

Mike climbed into the bucket seat of Alley's war surplus BT-13, and found it as familiar as his army serial number and as strange as the first plane he'd ever flown, so many years before.

"I sat in the cockpit a long time, not quite ready to dare myself to try it," he recalls. "Before turning on a switch I reviewed every step of my takeoff procedure like it was my first solo flight."

In a sense, it was. The BT isn't the world's trickiest aircraft, but it's no Ercoupe, either.

"I knew I'd have to take my hand off the stick frequently to operate prop, throttle and other controls," Mike says. "And that stick was going to have to be controlled by something."

Sitting there in the first plane he'd boarded since losing his right arm, Mike discovered talent in his knees. He learned that the knobby points on the insides of a pilot's knees aren't just hinges. They're flight attachments.

"I held the stick between my knees and found if I squeezed just right I could add a little back pressure to the stick, moving it back an inch or so, enough to bring the nose up gradually. I could set elevator trim to keep her slightly nose-heavy, so she'd nose down gradually if I relaxed my knee hold," Mike explains. "And I could swing my knees from side to side to add aileron, synchronizing rudder with my feet."

If it all worked in practice—and worked right the first time—Mike Jose might still be a flyer. If not?

He fired up the engine, taxied to the

(Continued on page 88)

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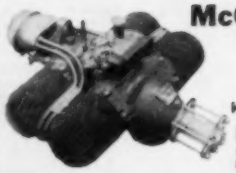

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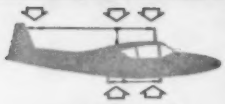

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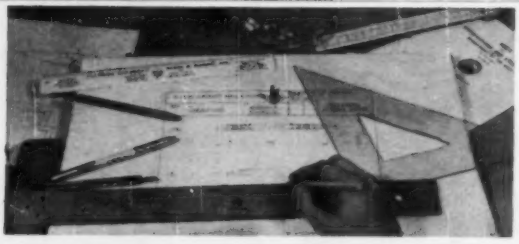

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(Continued from page 87)

head of Buchanan's Runway 19, and lined up the plane into the wind. Then he clamped the stick between his legs and pushed the throttle forward.

The engine thundered to a full roar and dragged two tons of tired airplane down the runway. Cautiously Mike left-handed the stick forward and brought up her tail as speed over the ground increased. The craft lifted cleanly off the pavement as he added gradual back pressure. There was "air" under Mike and the borrowed BT-13.

Mike flew the BT a lot that summer, and rode around in a rented Aeronca Champ, to teach his knees to fly.

But it's one thing to tool an airplane around the sky like a 50-hour student, and very much another to re-enter the ranks of working pilots with one wing folded. Mike thought about it a lot, while struggling with insurance and real estate.

It was nearly two years later, in fact, before he seriously considered trying to reinstate his commercial pilot license.

The first hurdle was the FAA medical. Civil Air Regulations specify: "Applicant shall have no . . . structural defect or limitation which would interfere with the safe piloting of aircraft, or other duties of his airman certificate."

All the medics could give Mike was a provisional "up check" to certify he was healthy. He'd have to convince a check pilot he was safe, despite a major "structural defect." Veteran instructor Andy Traverso of Buchanan Field was called into a huddle with Jim Leckie, FAA Safety Agent, and Kent Davis, manager of the Oakland FAA office.

"They aren't too happy about you," Traverso told Mike. "Leckie says he'll give you the ride, and to expect everything he'd give any commercial pilot—the full syllabus and whatever else he and Davis can dream up."

Mike flew 10 hours of dual instruction with Traverso, working through most of the commercial syllabus. One day he caught Mike flying S-turns using just his knees and feet. "You don't need me any more, Mike," he grunted. "I'll call Jim and get you a ride."

Jim Leckie is a great pilot. In addition to his post with the then CAA, he's Lieut. Col. James Leckie, commanding officer of the Marine Corps Air Reserve Group at Oakland Naval Air Station. A WWII Marine aviator in single- and multi-engine types, he has over 10,000 hours logged, including more than 2,500 flights with applicants for every type of license.

Mike would have to convince this professional task-master that an unorthodox one-handed technique, spliced to old reflexes and a solid background of airmanship, qualified him for a commercial ticket.

"We took off in the Aeronca, climbed to 3,000 to do our air work—lazy eights, chandelles, a series of stalls, slow flight, a couple of 720s," Mike recalls. "I was congratulating myself that the 'Jose knee system' was going to do the job—then he brought me down to the deck and the fun started.

"I got into the pattern at 800 feet, cut my power turning base, got my glide set up, banked around and lined up on final approach. I thought I had it made. Then Jim took over."

"I got it, Mike," the check pilot said on the first of several such approaches. He flew the little trainer inbound in a steady descending glide.

THE altimeter unwound to 100 feet, 75 feet, 30 feet over the fence, 15 feet at the end of the runway, 10 feet off the pavement—and Jim Leckie suddenly pushed the stick forward. The plane's balloon-tired wheels slammed into the runway for a crazy bounce, nose high with forward flying speed nearly lost, then Leckie let go.

"You got it, Mike," he said calmly and Mike had it, a big handful of stalled-out Aeronca.

"I popped the stick forward to start her nose down, clamped my knees on it just long enough to reach the throttle and pour on enough coal to regain flying speed, then grabbed the stick again to level, switched hand and knees again to chop power, then back again to the stick to set her in for a pretty decent landing."

Not just one landing. Maybe eight, maybe 10.

Then Jim flew it in low and slow, undershooting the runway: "You got it, Mike."

Jim bringing it in hot, with too much power, flying right into the concrete, rabbit-hopping: "You got it, Mike."

Jim coming in crosswind, drifting down the runway at a crazy angle: "You got it, Mike."

And Mike "rescuing" the airplane each time, making his landings, adding full power for takeoff, going around the pattern for another pass, touch and go, touch and go, touch and go.

"One of them was a real cutie," Mike chuckles. "This time he brought it in on power, low to the ground from 'way out, but too low and too slow and obviously not going to make it over the boundary.

"He ran out of speed and he ran short of lift about 50 feet out and we were just hanging there mushing, about to become a free-falling object, and he said, real calmly: 'You got it, Mike.'

"By now I was up with him. As I moved my hand to the stick, I eased on power with my elbow—the throttle's on the left side in the Airnocker—and made as good a landing as I'd made all day. He just grinned."

Leckie gave Mike the up-check, and Mike went back later and flew for his instructor's rating and his instrument ticket. He earned them all. Leckie gives nothing away unearned, even praise.

"There's no thrilling story to tell after flying with Jose," Leckie says. "And there shouldn't be. He stays ahead of his airplane and never gets into trouble. Using the same standards I have to use judging every applicant, I rate Mike 'well above average' on ability, and 'excellent' on judgment. In flying, judgment is the more important."

From Jim Leckie, that's a log book full of gold stars.

How does the country's highest flying one-winged bird get that way? Traverso swears Mike was born with five times the aptitude of most pilots to start with. Leckie feels that Mike gained additional incentive to compensate for loss of his arm, thus

(Continued on page 90)

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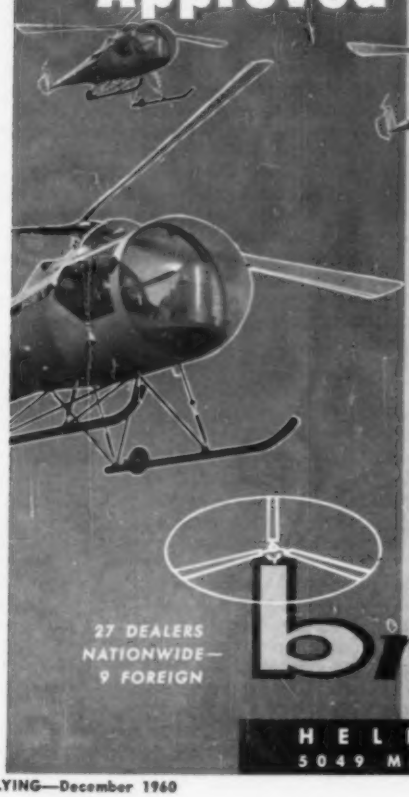

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(Continued from page 89)

refining his airmanship to a keen edge. Something must be credited to Mike's rich flying past and the kind of man he is.

Mike was born in Esparto, near Woodland, north-centrally located in California's rich Sacramento-San Joaquin produce basket, the youngest of five farm kids.

By the time he was big enough to wash an airplane, the Jose (it's Spanish: Hoze-AY) family lived near a flying field, and the lanky kid was hooked. He got a Saturday-Sunday job washing, propping, gassing planes, two days' work for a 15-minute instruction flight.

At this rate of exchange an air-minded farm boy of 16 couldn't waste a second. He soloed in four-and-a-half hours in a 40-horsepower Cub, then built up air time as fast as he could in the depression-slowed pre-war 30s.

Soon the warring world had need for flyers, and Mike was ready. He got his Army Air Corps wings at Luke Field, where they made him an instructor—a bitter blow for a new pilot who wanted to fly fighters.

Lieut. Jose taught advanced cadets in the AT-6s, and aerial gunnery in the 6s, in P-40s, P-38s, P-39s, P-51s. He instructed in the AT-11 Beech, in the B-25 Mitchell, and logged hours in the rugged Noorduyn Norseman.

THAT was the big pilot's past when they made him a civilian, climbing for the sky again in Charlie Jensen's duster, climbing down at Lodi that fateful day to inspect a motor mount.

It was certainly good enough, after Mike had regained his commercial and instructor's ratings, for Traverso. Andy had a job open and Mike went back to work in the air, teaching students and flying charters. It was part time, until Mike's pretty wife figured which way the wind was blowing.

"Mike," Darlene asked one day when Mike came home growling after a real estate deal fell through. "Have you ever thought about going back into flying full time?"

Mike was flying full time the next morning, and meeting another challenge a few weeks later.

The challenge was a C-45—a full-panel Twin-Beech, Air Force surplus. A contractor had bought the plane, ferryable out of Ogden, and they sent Mike for it.

The Beech had been "pickled" for two or three years and was no beauty, but Mike couldn't resist her.

"I HAD forgotten how much airplane this is," Mike says. "There are switches and controls scattered all over the place."

But he had one break: his long legs. With his feet on the rudder pedals, Mike's knees fit neatly under the control wheel. He could fly the airplane.

"I had a copilot as far as Reno, a ferry pilot who just came along for the ride," Mike says. "He got a big bang out of me flying the thing with my knees and one hand, reaching all over the front room to clean up the airplane after takeoff and before landing. When I shut her down in Reno, he said 'Good show, Mike' and left me. I flew to Concord the next morning."

A few weeks after the Twin-Beech had been rebuilt for the contractor, Mike and Jim Leckie took it up for another ride, this time for Mike's multi-engine rating.

Mike did it. Not just in the Beechcraft, but in a Piper Apache as well, and is now rated to fly both types. His multi-engine ticket is limited to these types until he checks out with Leckie in others, but Leckie by now is less limiting in his praise.

"He did a real nice job of it," Leckie says. "I gave him everything in the book, including stalls in all configurations and several engine-out emergencies. I cut an engine on him on takeoff, and I cut it on him in a steep climbing turn. It's pretty tricky flying. He managed."

Holding the only multi-engine ticket ever given a one-armed pilot is a tremendous achievement. But Mike's first love is the Stearman, his "flying Flit gun."

I stood on a low knoll above an apricot orchard near Brentwood one afternoon watching Mike at work. He passed over the tree tops, up, over, and down in a flawless arc, back over the orchard in the other direction, then up, over, around, and back again, his turns clean and crisp, his height above the branches hardly varying.

Once he waved—or I thought he did—and I waved back before remembering he had too much to do to be sociable a foot off the trees at 85 miles an hour. He hadn't waved, it turned out. He'd pulled out a rag to wipe the spray off his goggles. END

British Engines

(Continued from page 51)

ing the problem of future business aircraft requirements. They are very much interested in the potential market, which they believe might exist on the Continent rather than in England. They have been looking at a great variety of types of engines, from piston to pure jet, in making their appraisal of this market.

Two new engines which hold potential for future business aircraft are under development at Rolls-Royce. One of these is the RB-145, a development of the RB-108 with an additional compressor stage in front to increase the air flow through the engine and raise the pressure ratio. A turbofan version of this engine is expected to produce 4,000 lbs. thrust with a specific fuel consumption of .82 lbs./lb.-hr.

The other is a completely new engine known as the RB-153. This engine would produce 4,000 lbs. as a straight jet and 6,500 lbs. as a turbofan. At sea level static conditions the specific fuel consumption of this engine is estimated to be .57 lbs./lb.-hr.

Bristol Siddeley is very much interested in the business aircraft field, and R. H. Butcher, their press officer, believes that, among the many considerations that go into the selection of business aircraft, prestige will be an important factor. In his opinion these aircraft will be a symbol of success and they therefore will tend to become more sophisticated. He feels that business aircraft eventually will use turbofan engines, at least that turbofans will power the cream of the executive market.

The turbofan engine appears to be the most attractive type powerplant for business aircraft for several reasons. It has sub-

stantially lower specific fuel consumption than the straight jet, it is adaptable to single-spool powerplants which quite readily could be converted to fan type. It has a higher ratio of takeoff/cruise thrust and is supposed to have a lower noise level than the straight jet.

Among engines currently available for business aircraft at Bristol Siddeley is the Viper 11, which has just completed its type test at a rating of 2,500 lbs. thrust. Fuel consumption in this engine is a bit high at 1.07 lbs./lb.-hr., but the Viper is a low cost, reliable engine with a lot of history behind it. Bristol Siddeley is talking about an aft-fan version of the engine which would produce 3,600 lbs. thrust at an sfc of .75 lbs./lb.-hr. under sea level static conditions.

Although the Orpheus engine was used in the original Lockheed JetStar, Bristol Siddeley is planning to replace the Orpheus with a new engine known as the BS-75, which they expect will be better suited to the needs of the future business aircraft. The turbofan version of the BS-75 would produce a thrust of 7,500 lbs. Fuel economy of this engine should be excellent as the compressor pressure ratio of 13/1 is quite high.

A new engine under study at Bristol Siddeley is quite similar to the G.E. CF-700. This is a fan type engine and it would produce a sea level static thrust of 4,000 lbs. and an sfc of .56 lbs./lb.-hr.

Bristol Siddeley's association with the Blackburn Company in England undoubtedly will be a great advantage to them in going after the business aircraft market. This association was brought about in the recent mergers between a number of the aircraft firms in England. Blackburn is a Turbomecca licensee and therefore may build Turbomecca engines in England.

While many types of business aircraft will be powered by turbines of various kinds, there is an area where the turbine has not been able to replace the piston engine and probably will not for some time to come. This is in the small engine sizes. In the view of engineers at Rolls-Royce, the private owner will want a piston engine in his airplane because of its low cost.

Adrian Lombard thinks that turbine engines will continue to be expensive compared to piston engines until production rates have become high, that is, comparable to automotive rates. The important thing is not the total number of engines produced but the rate of production.

Others, however, still believe that it will be possible to make a small turbine engine, say in the 100-400-hp size, that will be competitive with the piston engine. Bristol Siddeley, for example, is working hard on designs it hopes will accomplish this objective. The principal problems they face are in obtaining both low fuel consumption and low first cost, especially with low or relatively low production rates. These are conflicting requirements and one of them usually is compromised.

Bristol, for instance, has set a goal of .6 to .7 lbs./hp-hr. specific fuel consumption, an engine dry weight of 116 lbs., and at the same price as that of a comparable piston engine. If and when they or someone else succeed, the piston engine will begin to fade out from the aircraft picture. The day looks a long way off. END

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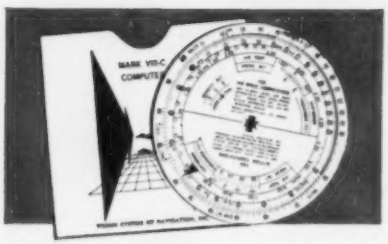

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Wichita Airport

(Continued from page 37)

show rooms and service-storage hangars. Four aircraft sales and service distributors on the airport show aggressive salesmanship and a keen interest in merchandising. It was obvious that the highly successful Wichita Air Fair staged last May and rescheduled for '61, has proved a good business barometer for aircraft sales and service activity in the area.

As is usually the case with a notable achievement, progress did not come easily. The Wichita story is one of dreams and initiative on the part of civic leaders. Since Wichita has committed a large portion of its economy to airplanes and their operations, it followed that its new airport would be angled to serve the private operator and pilot.

The story can be told in many different ways but research shows that, beyond a doubt, the "push" for this new aerial welcome mat came from the Park Commissioner for Airports, a long-time booster of aviation named Emory L. Cox. He is now director of the Board of Park Commissioners. Cox can recite the Wichita story without missing a comma.

Much labor and deliberation accompanied the move from the old 1,890-acre airport which had served so well as an air center for the Beech and Cessna plants situated on its boundaries. Locating the site was a thorny problem.

Possible site locations were limited to areas west of the city, outside a 10-mile lateral control and separation area stemming from the old airport's instrument landing runway. Studies pinpointed the present site, six and one-half miles southwest of town, as the most suitable.

It was 1949 before the Board of Park Commissioners could order the purchase of the 1,921-acre tract. After due process of law, $1,182,922 was paid to approximately 30 different land owners.

Lengthy legal negotiations and governmental dickering delayed a $9-million federal payment for the old field. Community leaders seized the rare opportunity to build an airport from scratch. Construction required three and one-half years. By 1953 the new municipal airport was ready. Results were heartening.

THE instrument runway is 7,300 feet long, 10 degrees east of north. It can be extended to 8,000 feet. Another runway extending 30 degrees west of north, is 6,300 feet long and can be extended to 7,000 feet. The airport is fully equipped for weather operations, and has high-speed turn-offs on runways. High-intensity approach lights complete the list of facilities for all-weather operations. Generous plane parking areas and ramps make Wichita Municipal attractive from a pilot's viewpoint.

The building plan is most attractively conceived. Utility and convenience for the airline passengers are stressed. All operating units are located along the west edge of the taxi strip which serves the main or instrument runway. Low, modern buildings with large glass areas, framed with salmon-pink brick and blue terra cotta, feature the design theme for the terminal and its service facilities.

The FAA control tower dominates the scene and affords controllers a full view in all directions. It is perched atop a 75-foot-high, seven-story structure which houses FAA communications and other government services. Wichita has one of the most modern and efficient FAA control towers outside of Idlewild and Los Angeles International Airports.

The crew on duty during our inspection, obviously fretting about the lack of "business" or traffic, had nothing but praise for the equipment already installed and for the radar installations yet to come. All radio and radar antenna towers or poles are positioned several thousand feet from the main buildings.

TERMINAL building areas are well-designed and constructed. The less-than-capacity scheduled air traffic makes the center extremely comfortable and convenient for the private flight party. Facilities include an excellent restaurant, a coffee shop, private dining rooms, taxi and limousine service and baggage areas, nursery for tots, show cases, a newsstand, a spacious lobby and rest rooms.

The restaurant and lobby face the airline flight ramp and loading gates. Passage ways are underground and connected to the terminal by escalators. Popular with pilots is the air-conditioned comfort which makes mid-summer stop-overs a welcome change from the heat of the plains country.

Special indirect lighting reduces image reflections on terminal windows, making it easy to view the airline ramp and loading gates after dark.

Transient reception areas are in a separate building that houses the airport manager's office. The Weather Bureau facility is in another and the Flying Farmer's national headquarters is in a third building.

Further to the northeast side of the airport are the large, modern and well-appointed hangars of fixed-base operators—Yingling Aircraft Service, United Aircraft Service and Air Flight, who handle Cessna, Beech and Aero Commander respectively. Aircraft Service holds the fuel servicing franchise.

Commissioner Cox considers Wichita a "milk-run" stop on the nation's scheduled airline system. He feels that the airport's future rests in the hands of nonscheduled operators and private plane owners, and that the nation's business pilots can make the terminal the number-one stopover port in the country.

Traffic trends at the airport bear this out. While scheduled airline traffic has declined in recent years, military, private and business aircraft traffic has been on the rise.

Wichita Municipal's owners and operators are free of debt. The airport cost $10,900,000 to build. Its annual budget is approximately $314,000 yearly. Last year, Emery Cox reported $120,000 in surplus funds after depreciation.

Wichita is proud of its position in the aircraft industry and considers itself the capital of civil and private aviation. The Board of Park Commissioners goes beyond this point.

They believe the future of the community depends upon its ability to hold the lead in civil flying accommodations. END

Mitchel Field

(Continued from page 55)

then sailed for Europe on August 13, 1917 under the command of Major Ralph Royce.

During World War I the area became one of the largest and most important training centers in the United States. The 42nd Infantry Division, known as the "Rainbow Division" and New York's "Fighting 69th" Regiment, departed here for France.

In July 1920, four DH-4B airplanes led by Captain St. Clair Street departed Mitchel for Nome, Alaska, returning from the 9,300-mile round trip the following month.

On Thanksgiving Day, 1920, the first aviation Pulitzer prize was won by Major C. C. Moseley at Mitchel, when he established a new American speed record of 156.5 mph. Beginning in 1920, the Pulitzer Trophy Race was the main United States aviation event for six years. The speed prize fund set up by the Pulitzer brothers was intended to promote aviation and stimulate aircraft development. This annual race replaced the Gordon Bennett Race, which terminated with the French victory in 1920.

In August, 1922 the first air route, the "Model Airway" was established between McCook Field, O. (now Wright-Patterson AFB) and Mitchel. This was an experiment to establish the requirements for airfield and en route aids for safe cross-country flying.

On November 4, 1922, a leaky engine water jacket had caused Lieuts. J. A. Macready and O. G. Kelly to land their T-2 Fokker transport at Indianapolis, Ind., after taking off from San Diego, Calif. in their second unsuccessful attempt to span the continent nonstop. The third attempt, they decided, would be made from east to west so as to reach the higher mountains late in the flight when they were light on fuel and could climb more easily.

At 12:36 p.m. on May 2, 1923, the big plane, weighing 10,000 pounds and carrying 780 gallons of gasoline, trundled down the field at Mitchel. With Lieut. Macready at the controls it barely cleared the hangars at the end of the field. After repairing a voltage regulator in flight, they landed the plane 26 hours and 50 minutes later at Rockwell Field, San Diego. The 2,520-mile nonstop flight was made at an average speed of 94 mph.

ANOTHER Air Corps pilot had a different kind of record in mind. Lieut. Russell Maughan wanted to fly coast to coast between the hours of dawn and dusk. Few airplanes of that day were capable of such a feat. He chose the swift Curtiss PW-8. This was the original Curtiss "Hawk." Powered by the new Curtiss D-12 engine of 440 hp, it could fly at almost 180 mph. It cruised at 167 mph.

On July 9, 1923 Maughan took off from Mitchel on what was to be a five-legged journey to Crissy Field, San Francisco, landing before dark. As he approached St. Joseph, Mo., the engine failed and he was forced to land. Ten days later he was off once more but again met with failure. After traveling 1,925 miles of the 2,800

(Continued on page 94)

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AGE _____ HOURS LOGGED _____

(Continued from page 93)

mile journey, the oil pressure gauge sprung a leak and a forced landing followed.

On June 23, 1924, at 2:59 a.m., Maughan took off from Mitchel into the graying morning. This time nothing failed. After 18 hours and 20 minutes flying, and 3 hours 28 minutes ground time, he arrived over Crissy Field one minute before dusk! He had spanned the continent between the hours of dawn and dusk at an average speed of 156 mph.

In 1925, the Army and Navy were competing for the 6th Pulitzer Trophy. Using identical Curtiss R2C3 racing planes, the race became largely a matter of pilot skill. The aircraft were tiny biplanes powered with a new Curtiss V-12 engine developing 610 hp and weighing less than 700 pounds. This gave them a weight-to-power ratio of 1.1, an outstanding figure even today. On October 12, after two days of bad weather, Lieut. Cyrus Bettis, a Mitchel officer, and Lieut. Al Williams, U. S. Navy, decided to take off. After a blistering race Lieut. Bettis won the trophy and set a new world speed record of 248.9 mph.

Jimmy Doolittle, who had worked previously with Elmer Sperry in the development of the turn-and-bank indicator, returned to Mitchel to research blind flying instruments. Under a project endowed by Harry F. Guggenheim the Sperry Gyroscope Company developed the artificial horizon and the directional gyro. These were installed in a small hood-equipped biplane. On Sept. 24, 1929, with the hood completely restricting his vision to the inside of the cockpit, Doolittle took off, flew a pattern and landed, using only his instruments for guidance. Mitchel was the true birthplace of instrument flying.

In August, 1938, a B-18 flew nonstop from Hamilton Field, Calif. to Mitchel. From March to June of that year "through-the-overcast" bombing tests were conducted in conjunction with the Sperry Gyroscope Company. These were to be of great value in the struggle soon to some.

World War II placed Mitchel in the role of defender of metropolitan New York City. In 1941 the Bomber and Intercepter Command headquarters were moved to Mitchel. Fighter aircraft stood ready to defend the city day and night. The base became a regular stopping place for flights and units en route overseas. Anti-submarine patrols were initiated immediately after Pearl Harbor and continued until this function was taken over by the Navy late in 1943.

THE 1st Air Force Provisional Staging Squadron was set up to prepare bomber units for combat. The 8th Pursuit Group was activated and trained at Mitchel for duty in the North African campaign. The 33rd, 80th and 89th Pursuit Groups were trained at Mitchel and saw action with the 8th Air Force in Europe.

At the close of hostilities, Mitchel became a separation center. In 1947 the 52nd Fighter Wing took over the defense of New York City. In September, 1947, the USAF became an independent service and the famous old "Fields" became the more formal "Air Force Bases."

As the unsure peace came to the world, Mitchel didn't have time to go back to record setting. Perhaps it was because the boys in civies were too busy sawing the wings off the P-38s and P-39s to set record speeds or maybe it was because the jets came to the Air Force and record making went "upstairs."

One last notable record came to Mitchel when in 1954 Col. W. W. Millikan landed there four hours and eight minutes after departing Los Angeles for a new transcontinental speed record in an F-86F. He averaged 634 mph.

IN 1948 the Continental Air Command came to Mitchel, and it became the home of the Air Force Reserve. The 1st Air Force returned after an absence of three years in 1949, and in 1951 the 514th Troop Carrier Wing was transferred to Mitchel, taking over the training of the vast numbers of "week end warriors" in the New York City area.

Mitchel enjoyed another first when in 1955 an extension of the Long Island University—called Mitchel College—was started on the base. It grew so rapidly that in 1957 it was set up as a separate institution, became approved by the New York Board of Regents, and was fully accredited by the Middle States Association in 1958 to confer bachelor degrees in Art and Science. Mitchel College is the first fully accredited college on a military installation.

Mitchel is one of the most beautiful bases in the United States. The Georgian style buildings were constructed during the period from 1927 to 1932 but only after the lack of funds had permitted it to fall into disreputable condition.

Further improvements were made during the war years and today Mitchel is a well-equipped base.

The ramps are lined with old veterans, such as the C-47s, one or two C-54s, a C-131, several T-29s and row after row of the "Flying Boxcars," the C-119s of the 514th.

To facilitate IFR as well as VFR traffic in and out of Mitchel the station is served by Hempstead Radio Range, Babylon Fan Marker and Compass Locator, M.P.N.-11 GCA unit, TACAN Radio Station, Mitchel Homing Beacon, approach lights on Runway 12-30 and high-intensity lights on Runway 5-23. Mitchel's traffic is under Idlewild approach and departure control.

The 514th is a combat-ready organization, manned by citizen airmen on call at a moment's notice. Their record displays a high degree of efficiency. They stand ready to meet any emergency: air evacuation of sick and wounded, airlifting food and medical supplies, or troop movements anywhere in the world.

The 2500th Air Base Wing under the command of Col. John O. Hall provides support for 258 off-base organizations in the metropolitan area as well as 38 organizations located on the base. Flying officers assigned to duties in the New York-Long Island area receive their flight training here. Administrative, personnel, supply, medical, financial and other services also are provided. Mitchel also is a site for testing equipment for processing high-priority cargo from the defense plants in the area.

Mitchel's service to the nation dates back 184 years. Today, as in the past two centuries, the mission of this AFB is service, supply and support. END

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Integrated Instrument Training

(Continued from page 45)

applicants by some 25 hours.

3. At none of the schools did the integrated program average more than two hours and 10 minutes total time above that required for the regular VFR training program.

From this comparison we conclude that the integrated instrument program does not significantly change the amount of flight time required to obtain a private pilot certificate. Also, many instructors felt that practicing maneuvers on simulated instruments enhanced the VFR training.

AS FOR the private pilot applicants' ability to control the aircraft, it was generally agreed among all of the check pilots that the students tested did possess the ability to control the aircraft. Some had higher proficiency than others, of course, but in some cases, FAA inspectors said the students had equal ability to recover from unusual attitudes as the instrument-rating applicants.

At Ohio State when our students had between 40 and 42 hours of flight time, which included five hours S.I., I gave each of the 11 students a special test on instruments. Of the 11 students, 10 were at private pilot proficiency over-all. I ran a total of 450 maneuvers which represented the variety of possible attitudes in which a pilot might inadvertently find himself under instrument conditions. Not once during those 450 maneuvers did any student lose control of the aircraft!

Even more interesting was their ability to fly well within tolerances dictated for the VFR portion of the private pilot flight check. In almost all cases, including those who were not at private pilot standards over-all, the students would perform promptly, precisely, and positively. I wish the critics had been there. They would have been impressed had they the same opportunity to fly with these students.

The third question most frequently voiced is, "How can a non-instrument-rated instructor give instrument instruction?" It is true that a flight instructor who is rated for instruments and instrument instruction is best qualified to teach instrument flying.

Does this mean, however, that an instructor who is not instrument rated cannot adequately teach Instrument Reference Attitude Control? Remember, when a pilot has an instrument rating, it means that he not only has control of the aircraft's attitude but that he understands en-route procedures, instrument approaches and letdowns, and orientation procedures.

All that is being asked of the student is that he be able to keep the airplane under control and make turns, gentle climbs, glides, or to recover from a spiral dive, if he finds himself in an emergency situation. Again, this does not mean that the student pilot is required to make a perfectly coordinated and timed standard-rate turn with instruments, holding his altitude within 25 feet under VFR conditions with the natural horizon for reference.

(Continued on page 96)

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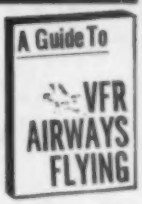

This is not a book on how to fly an airplane. Instead, it provides critical information for the VFR pilot. Major areas include:

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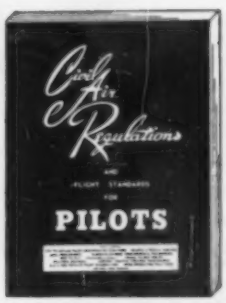

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(Continued from page 95)

My experience while flight checking our students indicated no appreciable difference in student performance between those trained by instrument-rated instructors and those trained by non-instrument-rated instructors. One of the most adept students on instruments, within the context of what we are trying to accomplish, was trained by a non-instrument-rated instructor. The one difference noticed was that the students trained by non-instrument-rated instructors were not as sharp on the finer techniques of precise roll-out on heading and precise leveling-off at altitude.

I believe that it is possible for the non-instrument-rated instructor to teach IRAC successfully. Flight training, both visual and instrument, is based on attitude flying. The student is instructed to visualize his attitude with respect to the natural horizon or through the instruments.

WHILE the student is practicing maneuvers, the instructor's job is one of guiding and coaching. The instructor verbally assists the student in interpreting his attitude from the instruments and by encouraging him to scan. This is done in much the same way that an instructor verbally coaches a student to be cognizant of all cues to attitude control while going through a landing or a series of stalls.

Since the instructor has visual contact during the entire period the student is on instruments, he is constantly aware of the aircraft's attitude and is aware of any deviation from desired performance and can give the student guidance.

Table I

	Illinois[1]	W. Va.[2]	OSU
Number of students	18	10	11
Number receiving private pilot certificate	18	10	10
Average total flight time	34:05	48:08	43:36
Average dual flight time	23:15	28:02	28:12
Average solo flight time	10:50	20:06	15:24
Average Link	11:03	0:00	0:00
Average simulated instrument*	6:10	4:31	5:00

Table II

	Illinois	W. Va.	OSU
Average total flight time to receive private pilot certificate under regular VFR training program	33:35	46:00	41:40

* *Simulated instrument time is included in dual time.*

1. *University of Illinois Institute of Aviation, Aeronautics Bulletin No. 18, Simultaneous Contact—Instrument Flight Training.*
2. *West Virginia University College of Engineering, Experiment in Contact-Instrument Flight Training.*

True, IRAC training does make it mandatory that the instructor have a basic understanding of the function of each instrument (and it's a rare instructor today who does not), but it does not mean that he must be finely versed in instrument en-route procedures, the function of the air traffic control center, and approach control.

In view of our experiences we have good reason to believe the private pilot can develop proficiency on IRAC flying. Logically, the next question that arises is, "What are these private pilots going to do with this ability?"

Are we going to create a mass of demons who will fly indiscriminately through clouds, thunderstorms, fronts, and the like, creating hazards to IFR traffic on the airways and on instrument let-downs to control zones? I am sorry to agree that there will be some. By the same token, there are people flying today who have no instrument training but who still enter clouds without a clearance.

It is unfortunate that regardless of how hard the conscientious instructor tries, there are always a few people who go their merry way throwing caution and their instructor's advice to the wind. There is an old saying that is most appropriate: "There are always two per cent of the people who do not get the word."

I don't believe that we can deprive the

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sensible 98 per cent of increased knowledge because two per cent misuse it.

It is contended that IRAC training gives a pilot greater respect for weather. The IRAC-trained pilot, having experienced obscured visual reference conditions, is more acutely aware of its associated problems.

Who has more respect for weather than experienced instrument pilots? Look at the number of pilots who have completed an instrument training course and received their instrument rating but who actually never use or even intend to use it. Is it possible then that those pilots who have never experienced even five minutes of flying by reference to instruments alone can have the same respect for instrument conditions as those who have IRAC training? Again, I think not.

This question, too, has been raised: "Wouldn't it be better to spend time teaching the student to recognize deteriorating weather and all of the different variations of weather rather than to teach him to fly by reference to instruments?"

Hearty congratulations to the flight instructor who will give his student extensive instruction in recognition of weather! This has always been a weak area. We know that the flight instructor has inadequate text material to use in describing the idiosyncrasies of our atmosphere.

We all have known experienced pilots who are meticulous in their pre-flight planning, and we also have seen these same experienced pilots run into strange weather phenomena; weather that had not been forecast or reported; weather that required emergency action. If it happens to the experienced, it can happen to the inexperienced. Isn't it better to be prepared for it?

So why eliminate instrument instruction? Aren't we building a more knowledgeable pilot by giving instruction in as many areas as possible? Can't we give instrument instruction and teach weather recognition, too? They are not incompatible. As we have established, teaching one does not take time away from teaching the other. To better prepare our students for the things they will face during their flying career, I believe we must include IRAC training.

To my knowledge, the sixth question remains unanswered at this time. What sort of proficiency will a pilot still have if he needs to use the IRAC five years from now? Assuming the pilot doesn't practice during the next five years, his proficiency will be low. Will it be lost? I don't know.

But the problem of proficiency is not a new problem. It always has been necessary to encourage the rated pilots to practice basic flying techniques. Instrument emergency procedures must be practiced just as crosswind and emergency landings must be practiced on occasion by private pilots. On a cross-country flight with a fellow pilot or instructor as observer, sufficient proficiency can be maintained with a few hours of practice every six months.

Since few people now have considerable experience with this program, it is natural to be curious of its ultimate outcome. Available facts certainly should suggest that the program has merit. Since all operators and flight instructors have the same objective at heart, that of making flying safer, it is imperative that we should unite and give this new regulation our support. END

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Lake LA-4

(Continued from page 43)

can be carried on easily in flight; noise level is moderate.

The nose wheel is full swiveling but taxiing is easy once you learn to use the brakes firmly and move along.

Takeoff in the fully loaded condition from Grenier Field, N. H. required considerably less than the 650 feet claimed by the company and the plane entered a better than 500 fpm, indicating a solid 80 mph.

Leveling off at 3,500 feet the LA-4 could be trimmed for "hands-off" flight even in the moderate turbulence. It held its course well. An indicated 120 mph trued out to approximately 127 at 72 per cent power, pulling 2,350 rpm and 25 inches mp.

We headed north for the lake country and made the first landing on Lake Winnisquam. Waves were between 12 and 18 inches in height. The plane is glided down with flare-out to achieve a level flight path just a few inches above the water, held off until a full stall occurs; as the tail touches the water the control wheel is moved firmly forward to establish a level flight attitude on the water. This distributes the wave shock over the hull. The LA-4 rides level in the water and the flat-bottomed wing floats prevent any rocking.

The water rudder control is between and ahead of the pilots' seats. It can be extended or retracted by flipping the lever to the fore or aft position. Control on the water with the rudder down is positive. Turns can be made in all directions without regard to the wind. There is little weathercocking tendency but the plane will turn into the wind if uncontrolled.

High speed taxiing is done with the water rudder retracted; sharper turns can be made this way. Control is good and turns performed even under full power can be so sharp as to press you against the side of the cockpit yet there is no tendency to dig a wing float or lose control. If the throttle is suddenly closed in the middle of a high-speed taxi turn, a fallout will occur. The plane sinks off the step, water goes in all directions but the Lake has all the positive attributes of a cork.

Takeoff was made into the wind. Windshield spray can be reduced by holding the wheel full back until the Lake "climbs" up out of the water; lower the nose to place it on the step and it accelerates quickly to takeoff speed. Takeoff is delayed if an attempt is made to pull the amphibian off before flying speed is reached. With the full load it would fly off at approximately 65 mph while later, with only two on board, it came off nicely at 55 mph. Full flaps are used for both takeoffs and landings.

Flaps are of the slotted type and extend 70 per cent of the wing span; they are similar to the plain flap but the gap between the wing and the leading edge of the flap has specific shape. High energy air from beneath the wing rushes through the gap and accelerates the upper surface boundary layer. This delays separation and greatly increases the lift coefficient of the wing. It contributes significantly to the slow-flight capabilities of this airplane.

On two later takeoffs we got close to a "porpoise" but it was easily corrected by applying back pressure to stop the porpoise and then lowering the nose to return to the step. No undue bouncing was noted at any time and "hands-off" water takeoffs and landings can be made. High-speed water work and landings in the earlier Skimmer C-2 and many other waterplanes result in a build-up of pressure in front of the hull, which is pushed upward until a loss of support occurs; then the plane pitches downward only to be boosted up again and a vicious cycle is on. This is frequently aggravated by inept pilot action and in some cases loss of control has occurred.

LAKE LA-4

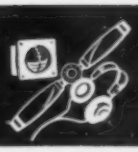
Specifications:	
Gross weight	2,400 lbs.
Empty weight	1,575 lbs.
Useful load	825 lbs.
Fuel Capacity:	
Maximum	40 gals.
Normal	30 gals.
Oil capacity	8 qts.
Power: Direct-cooled, 4-cylinder Lycoming O-360A1A engine, rated (2,700 rpm) at	180 hp
Power loading (pounds per hp)	13.3 lbs.
Propeller: Forged dural, constant-speed Hartzell	72 in.
Dimensions:	
Wing span	38 ft.
Wing area	170 sq. ft.
Wing loading (lbs./sq. ft.)	14.1 lbs.
Length	24 ft., 11 in.
Height	9 ft., 4 in.
Performance:	
Speed (Standard air; gross weight):	
Normal cruise, 75% power at 6,000 ft.	131 mph
Stalling speed	50 mph
Range—(Full fuel; gross weight):	
Maximum range	627 mi.
Normal cruise, 75% power at 6,000 ft.	500 mi.
40 gallons	4 hrs.
Rate of climb (Sea level)	800 fpm
Takeoff run (Standard air; gross weight):	
Land	650 ft.
Water	1,125 ft.
Landing roll (Land)	475 ft.
Landing run (Water)	600 ft.

In lengthening the hull and adding the V-bow to the LA-4, the pressure point was moved aft, resulting in raising the entire airplane and not just the nose.

Landing in Lake Winnepesaukee, a narrow beach was found; we lowered the landing gear as we neared the beach and taxied ashore. No difficulty was experienced and adequate power was available to taxi up a relatively steep bank. Once or twice while maneuvering on shore a wheel would break through the sand-bottom surface but a burst of power would pull the plane through. This was done with four people on board. Good braking action was available in and out of the water.

A shallow water dock approach was made with the wheels on the bottom. We simply taxied up to the dock and stopped with the nose of the plane almost touching. The brakes were set and we deplaned. To depart the dock, the gear was placed in the up position; the nose gear retracted immediately but it was necessary to rock the plane backward to retract the main gear.

This is a safety feature that prevents inadvertent gear retraction when the weight is on the wheels, yet permits the gear to be retracted when aground in water. The plane was afloat so we pushed off, started



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the engine and taxied out into the main body of the lake. The engine is shut down as the dock is approached. A plastic pad in the nose absorbs shock of nose contact.

Landing at the nearby Laconia Airport brought an unexpected thrill and indication of the structural integrity of the landing gear—we landed with the brakes locked! Touching down in a nose-high attitude, the nose wheel slammed down violently, brakes were quickly released and a normal rollout followed. There was no damage. The main landing gear is so constructed that on ground contact the wheels move aft and upward against the shock struts; there is long travel and the gear is sufficiently rugged to permit consistent rough-field landings. Main gear width is 11 ft. 2 in.

We transferred the two passengers to another plane and Strayer demonstrated the plane's solo-flight capabilities. A short-field takeoff with a 10-knot wind took less than 200 feet; the landing roll was less than 100 feet before a 180-degree turn was executed. And just to show that it was not an accident, he did it twice. A landing was made in a lake off the side of the airport which was approximately 1,000 feet long, followed by a circular takeoff that used less than a third of the lake.

FINAL landing was made at the Sanford, Me. airport with a 15-knot direct crosswind. A "crab" was carried down to touchdown point. When the wheels touched we let go of the controls and the plane swung into alignment with the runway and rolled out straight ahead, hands and feet off!

The half day spent with this airplane well confirms its versatility and forgiving nature. Its history shows that about everything that can be done to a small amphibian has been done. It has been fully stalled into water—with the landing gear down—with no damage (but this is not a recommended procedure). It was landed on grass—gear up—no damage. The latter is to be demonstrated around the country; a fiberglass hull coating will prevent pebble damage to paint.

The wing, control components, cabin roof, windshield and nose section are constructed in one wing of the Sanford plant while a double assembly line occupies the main section. The hull, starting with the rear section, traverses both lines to completion. Workmanship is superior.

All aluminum materials are allodyned which produces a corrosion resistant coat; zinc chromate primer follows, which adds further protection. All seams are taped and compounded for water sealing. The compound retains its pliability for the life of the airplane, set at a minimum of 20 years.

Bottom skin is 75 ST of .051 thickness, well reinforced by closely placed vertical and horizontal members. The hull is broken into four water-sealed compartments; each is provided with a drain plug. In addition there are, of course, the two floats, plus the fuel tank; seven in all. The wing center section main spar passes through the hull just aft of the cabin and is of steel.

The engine mount main structure is of 4130 high-strength steel and is encased in an aluminum sheath of stressed-plate design. This must be in place for flight as it adds the necessary fore and aft rigidity

(Continued on page 100)

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(Continued from page 99)

to the pylon. External side braces provide lateral support. The engine structure is stressed for 37 Gs; F.A.A. requirement for this structure is 22 Gs. All steel parts are cadmium plated.

Access to the engine is excellent; the front section of the cowl and the side panels open upward exposing the powerplant from all angles. Airflow through the nacelle is provided by the pusher propeller and aided by baffling. No fan is needed and cooling is adequate for all ground, water and flight conditions.

Controls throughout are operated by torque tubes with sealed bearings, except for the aileron controls in the cabin area. These are stainless steel cables that become torque tubes as they enter the wing. The outboard 25 per cent of the elevator is separate and is a hydraulically operated trim. It is controlled by a small spring-centered lever located between pilots' seats; movement is fore and aft. Aileron and rudder trim is provided by ground adjustable tabs.

The wing structure is extremely rugged; strength and stiffness is provided by an oversized main spar which extends from the root to outboard of the flap and wing-float attachment point. It houses the inward retracting main landing gear. The gear trunnion is of cantilever design and attaches to the main spar to transmit landing forces through the wing. Rubber bumpers are available as extra equipment on the leading edge of the wing tips and floats for their protection during docking operations.

The hydraulic system is a complete unit located in the center of the instrument panel; a telescoping emergency hand pump is provided. The reservoir is filled from the anchor compartment in front of the windshield. Hydraulic fluid is high-grade kerosene. Rigid portions of the tubing are coated externally with zinc chromate and clamped to bulkheads and other supporting structures. Rubber-coated steel mesh tubing is provided where flexibility is required. A pressure relief valve precludes excessive pressures and replaceable filters exclude foreign material.

The fuel cell is a Mareng bladder type of 40-gallon capacity. It is located aft of the cabin in the upper midsection of the hull. Electric and engine-driven fuel pumps are provided.

THE cabin is located forward of the midwing and affords excellent visibility. The interior is tastefully done in Naugahyde with colors matching the exterior paint. A two-color exterior is standard; three colors come at extra cost.

LA-4 standard equipment includes dual controls, windshield defroster system, cigarette lighter and ash tray, tow bar, paddle, anchor and anchor light.

Final assembly and initial test flight is at the Sanford airport. Painting, final test flights, sales and customer service are at Grenier Field, N. H.

Lake checks out and gives amphibious (sea) rating to every purchaser (free) and, in case of used aircraft, only the expense of the pilot need be paid. With no previous water experience 50 takeoffs and landings are required. END

Effects of Drugs

(Continued from page 56)

before takeoff.

In his flight planning, the pilot should give careful second thought to the medications which he may be taking regularly without ill-effects, while earthbound.

As with alcohol, the amount of the drug, the rapidity with which it is absorbed into the blood, its side effects, especially on the nervous system, and the speed of its destruction and elimination by the body all influence the proper use and safety of the drug. Over-medication is hazardous—even aspirin in large doses can cause ringing in the ears and interfere with hearing.

Motion-sickness preventives should be used with caution; generally, they are more liable to dull the pilot's alertness and memory than to affect his actual muscular skill and coordination. Drowsiness, dizziness, lowered navigational skill, less reliable memory of orders in special sequences and impairment of rapid calculation have been observed after these medications.

The use of medication to counteract fatigue and sleepiness during operation of aircraft is most unwise, and is disapproved generally by the FAA and by airline medical departments. It is true that medications such as dextro-amphetamine, postpone the desire to sleep without sacrifice of accuracy or skill for limited periods of time, even in conditions of mild oxygen deficiency. It is also true that the rested, alert pilot derives the most benefit from such medication, which he, of course, does not need. The drowsy, fatigued pilot who uses the medication to combat his deteriorating performance at the controls is the one most liable to develop excitement, irritability, rapid pulse, dizziness, headache, and visual hallucinations as side effects of the drug. The history of many highway accidents illustrates the false logic behind the use of these medications, except under unusual or extraordinary conditions. Flyers should avoid the use of "pep" pills.

Antihistamines, useful in allergies, may help congestion of ears, nose and sinuses when change of altitude causes pain in these areas; but the drowsiness and mental dullness resulting from these drugs can cause the pilot serious or annoying difficulties. If your allergy is plaguing you, let someone else do the flying.

The popular tranquillizers relieve tension and anxiety under stress, but lower the pilot's alertness to risk situations. If the pilot needs tranquillizers or narcotics, he should avoid the cockpit or flight deck.

Streptomycin at times may cause nausea, loss of balance, dizziness, and hearing difficulties. In some individuals, sulfa drugs may cause muscle and nerve disturbance and mental confusion. Gas-forming medications such as seltzers may result in unpleasant abdominal swelling at altitude if taken too soon before takeoff.

Protection of flight personnel from malaria is well accomplished by chloroquine, which is not toxic at altitude despite minor effects upon vision. Quinine, especially after prolonged use against malaria, may cause stomach distress, dizziness, and decreased hearing, especially at altitude. Quinacrine and paludrine may be used by flight per-

sonnel; but not plasmochin and pentaquine, especially combined with quinine.

As all drugs cannot be discussed in this brief review, a few rules may help:

1. Whenever possible, omit drugs from your preflight check list.
2. NEVER take a new unfamiliar medication within six hours prior to takeoff.
3. Use the smallest dose that is effective. Twice the dose rarely brings twice the good effect, and nearly always brings ill effects.
4. Be familiar with all the side-effects of a medication as it affects *you*.
5. If you require medication for an acute physical condition, put someone else in the left-hand seat.
6. When in doubt, check with your own physician or with your medical department physician. It may save you the cost of installing a panic button on your aircraft's instrument panel. END

At Last the Wind

(Continued from page 57)

as far from the smooth purr of modern engines as the roar of a sabre-tooth from the quiet sigh of a tabby asleep at the fireside. Each cylinder exploded as if it had a set of very short fuses instead of spark plugs. As the engine ran it sounded to me like a tight string of thick chinese firecrackers going off a yard from my face.

I wasn't the only one who heard that sound. As I S'ed along the taxiway, a knot of hangar-flying pilots moved forward to watch the bright machine go by.

We taxied at 20 miles per hour; I moved the throttle forward and back just to hear the engine's noise rise and fall.

The noise flooded us as we ran up the engine for a check near the end of the runway. It dropped down again when I released the brakes and swung around to face the tower's green light. With full rudder the slightest burst of throttle was more than enough to turn the little airplane sharply about, and the tower undoubtedly had some comment to itself about the drunken path of the Ryan taxiing on to the active runway.

BUT the tower was forgotten. The people and planes and hangars by the taxiway were forgotten, too, and the rumors I had heard about the flight characteristics of the PT-22. All that existed then for me was the broad black runway to each side of the nose and the mind-shaking roar of 160 horses as the throttle came forward.

The tail was off the ground before I thought about moving the control stick, and the wind became a living thing around my head. Eighty miles per hour and we were off the ground. From the corner of my eye I caught a flash of the sharp clear shadow the trim little airplane left behind. Even at full throttle, each cylinder fired its own separate and distinct explosion; unlike the purr of the moderns, there was no guarantee that the next cylinder would ever fire. But it always did, and as the ground fell full away, I knew that I would never be disappointed in the reality of this flight.

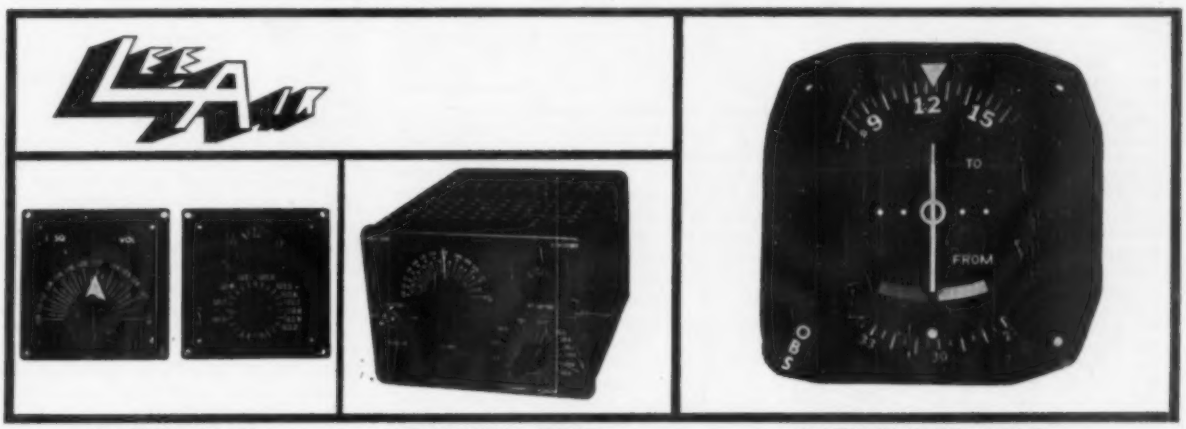
It was better than I had dreamed. I could squeeze the control stick; that solid grip was no dream, but here and now. I could throw my head back and drink the pressured wind and taste the exhaust from the black-finned cylinders. The world was where it belonged, beneath our wheels.

I turned to look back at Hank, hoping to catch my imperturbable friend in an unguarded moment. I did. His smile was as broad and uncontrolled as mine. We couldn't talk over the roar of wind and engine, but we both had the same thought: at last we were flying.

Through the elemental sound rang another tone I had never heard and couldn't place. It was a whine, a faraway scream, the soprano hum of a distant choir. I turned again to Hank, looked a question at him and tapped my ear. He was puzzled for a second; then he grinned and pointed to the flying wires stretched from fuselage to wing. They were blurred and hard to see, and suddenly I understood. They were blurred with their song. The wind in the wires! How long I had waited for that sound! Since I first read Captain Rickenbacker's "Fighting the Flying Circus"; since I saw Bevo Howard pick a handkerchief from the ground with his Jungmeister; since I raised my right hand and became a flying aviation cadet. And now I heard the wind in the wires.

At 3,000 feet Hank pulled the throttle back and shouted, "Seat belt tight?" I nodded and pulled it a little tighter, molding me closer to the buckled parachute. The long nose came up and across to the left as he cleared the area ahead. It paused

(Continued on page 102)



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Flying December INDEX OF ADVERTISERS

ADVERTISER	PAGE NO.
A C Aircraft Spark Plugs	67
Academy of Aeronautics	98
Acme School of Aeronautics	97
Aero Design & Engineering Co.	12, 13
Aeronautical Services, Inc.	82
Aero Products	88
Aero-Progress, Inc.	91
Aero Publishers, Inc.	95
Aircraft Radio Corporation	9
Air Fibre	93
Airline Operations Training, Inc.	80
Air Products Company, Inc.	96
American Airlines	31
American Flyers Incorporated	93
Applied Science Products	95
Bay Aviation Services Company	65
Bensen Aircraft Corp.	105
Brantley Helicopter Corporation	89
Cessna Aircraft Company	16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
Collins Radio Company	15
DeLong, D. F.	88
Don Juan Watch Bands	85
Don Lee Company	80
Doubleday & Co.	99
Downer Aircraft Industries, Inc.	14
Embry-Riddle Aeronautical Institute	64, 72, 86
Esso Standard, Division of Humble Oil & Refining Company	61
Federal Ski & Engineering	80
Florida Aircraft Radio & Marine, Inc.	88
Flying Equipment Sales Co.	82
Flying Movies	98
Forpak-Aero	70
Garrett Corporation, The	63
Graubart Aviation Inc.	100
Hiller Aircraft Corporation	7
Indiana Technical College	88
Jay's	82
Jeppesen & Co.	75
Kane Aero Equip't	76
King Radio Corporation	74, 83
Krilar Company	87
Lake Aircraft Corp.	28
Landseair	100
Lee Air Electronics Inc.	101
McIntire, Marion, M.	6
McMillan Laboratory Incorporated	6
Manger Hotels	94
Motorola Aviation Electronics Inc.	78
National Aeronautical Corporation	29
Navion Aircraft Company	11
Newark Air Service	85
Northrop Institute of Technology 4, 68,	77
Nova-Tech, Inc.	73
Pan American Navigation Service	84
Parks College	90
Perry Studio	82
Phillips Petroleum Company	4th Cover
Piper Aircraft Corporation	5
Puritan Compressed Gas Corporation	27
Riverside Records	74
Rock Sound Club, The	70
Rolls-Royce Limited	1
Ross Aero Publishers	81
Ross School of Aviation	81
Sensenich Corp.	87
Shannon School of Aeronautics, Inc.	100
Shell Oil Company	71
Skycraft Design	80
Southwest Airmotive Co.	2nd Cover
Spartan School of Aeronautics	66
Sunny South Aircraft Service Inc.	3rd Cov.
Tactair Incorporated	10
U.S. Air Force	79
Varsity Shop Specialties	83
Weems System of Navigation	92
White & Sons, Inc., W. O.	98
White Plains Watch Co., Inc.	89
Whitted Airport, Albert	80
Zahns Airport	69

(Continued from page 101)

and came back down to the right, and the stubby wings flashed silver back to the sun. The little machine rolled, and its roll was a new feeling to me. It was not the heavy-powered roll of the T-28, it wasn't the speed-fed hydraulic-controlled roll of the F-86F or the F-100. It was the roll of an airplane that needed a pilot, an airplane that was not going to fly herself through any flight maneuver. She had to be flown through the roll, every degree of the way.

We got to know her a little better in her stall. Our PT, we learned, didn't like to stall. I brought her nose up, and as the airspeed needle swung down, I felt that she wasn't enjoying herself as she was a moment ago in her acrobatics. At 60 miles per hour the stall tapped on the stick like a fast rubber mallet hitting just below the grip. The tapping grew harder and more urgent as the airplane warned me of what was ahead. I didn't heed her warning. I kept the stick coming back, and pressed her dropping wing back level with right rudder.

The roar of her engine and the song of her flying wires changed to an uncomfortable racket as she fought. Still I kept the rudder going back and forth, forcing her back to wings-level. As the airspeed fell lower, she forgot that we were ever friends; she kicked and screamed and hammered at me. I could hold her no more, and against full left rudder her right wing went down, her long nose dropped toward the green fields below, and the altimeter unwound as she drank back her airspeed. We stalled her again, this time from a forward slip. Book-like, she recovered to straight flight, but as we held the controls crossed, the short wings pivoted and she snapped to give us a good full view of the hard ground below.

We learned that our airplane had a temperament that some might call high-strung. It seemed to me, though, that she gave us plenty of warning in her stall. If one was so insensitive as to disregard her warning near the ground, however, I do not doubt that she would place him quickly back on the rocky earth where he was born.

With the fuel cork bobbing low, we turned into the landing pattern, held her down final approach at 90 miles per hour. The black runway widened out ahead, and suddenly the wheels were adding their rolling noise to the idling engine's quiet.

We S'ed back to the parking area, and a blast of throttle spun the little machine in by her fabriced friends of the ramp. I brought the red-knobbed mixture control lever back to idle cutoff.

As we walked by the flight office after our shortwinged friend was tied and covered, her former owner stepped to meet us. He knew it was my first flight in an open-cockpit airplane, and he directed his question to me. "How does the little '22 compare with your jets?"

"I can't say that there's much comparison," I answered. "This is the first time I've ever been able to fly." END

Conrad 9800

(Continued from page 49)

elevator was held and the aircraft allowed to enter a secondary stall which also was held through the break. Throughout both breaks, the ailerons remained effective.

In landing configuration, trimmed for cruise, power chopped and the aircraft held in flat attitude, the loss of lift did not occur as the elevator ran out of effectiveness. When the speed dropped to 80 mph, the longitudinal oscillations developed again, but more severely this time.

In checking single-engine performance the left propeller was feathered at minimum single-engine control speed at 5,500 feet MSL. The airplane was in landing configuration and acceleration to best single-engine climb speed of 123 mph was slow, but not excessively so. Once the proper speed was attained, the airplane climbed well.

On ILS approach to Burbank at 120 mph IAS with gear down and approach flaps, the Conrad 9800 handled very well through the more than 11 miles from outer marker to touch-down, despite the hot day and turbulent air. Full flaps were lowered after the middle marker and a wheel landing effected at about 85 mph.

Airframe modifications which convert a Twin-Beech into a Conrad 9800 include a one-piece panoramic windshield offering improved visibility; a change in the stabilizer angle of attack from two-and-a-half degrees negative to one-half degree negative, which gives the airplane a more nose-down attitude in cruising flight by reducing the frontal area; sealed top and bottom elevator gaps to reduce drag and increase elevator effectiveness; improved stall strips on the leading edges of the wings.

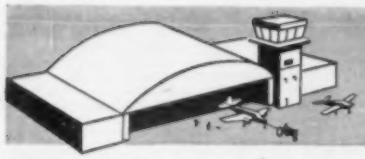
The wing tips are squared off, reducing the wing span by one foot though the total area remains unchanged. Wing tips are fabricated of fiberglass and contain antennae for navigation and communication equipment. The main landing-gear doors are beefed up, allowing a maximum gear-down speed of 160 mph IAS. Flap speed is 146 mph.

Conrad power-package modification consists of a new stainless steel dishpan, which uses three troughs located at four, eight and 12 o'clock positions to evacuate all nacelle air. All three carry the redesigned exhaust stacks. New cylinder head and barrel baffles use lower volume of air at higher velocity for more efficient cooling. The reworked cowling has augmenter type exit plates while electrically operated single cowl flap located at the top trough regulates cylinder head temperature.

WITH this package METO is 450 hp, the same as for takeoff. Conrad conversions powered by carburetor engines have new ram scoops mounted on the bottom of cowlings and new muff heaters for better deicing.

Fuel injection system installed on N9800 made a very favorable impression during the evaluation flight. The system is completely automatic. Outside of turning it "on" and "off" the only thing left is the idle cut-off, which is electrical. Boost pumps, of course, are used (as normal) for takeoff and landing.

The Simmonds SU-580 series of fuel injectors, offered by Conrad, are designed to compensate mechanically for altitude, temperature, manifold pressure and revolutions per minute. END



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D-18S Beechcraft. 1946, model, hydamatics. New de-icers, 80 gallon nose tank, dare transciever, and ADF, ARC omni, etc. Very clean inside and out. Wire, write, or call. H. J. Bailey, GPL Division—General Precision, Inc. Pleasantville, N. Y. ROgers 9-5000.

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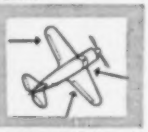

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DUCTED fan design. Used in Air Cars and Flying Platforms. Specifications and Six pages of drawings, $2.00. Tyna-Turbine Engines, Box 373, Chandler, Arizona.

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1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Ziff-Davis Publishing Company, 434 South Wabash Ave., Chicago 1, Ill.; Editor, Robert Stanfield, 1 Park Avenue, New York 16, N. Y.; Business manager, Matthew T. Birmingham, Jr., 1 Park Avenue, New York 16, N. Y.

2. The owner is: Ziff-Davis Publishing Company, 434 South Wabash Ave., Chicago 1, Ill.; Estate of William B. Ziff, 1 Park Avenue, New York 16, N. Y.; A. M. Ziff, 1 Park Avenue, New York 16, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

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5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required by the act of June 11, 1960 to be included in all statements regardless of frequency of issue.) 215,424.

MATTHEW T. BIRMINGHAM, JR., Business Manager.

Sworn to and subscribed before me this 6th day of October, 1960.

[SEAL] WILLIAM PROEHMER, Notary Public.

(My commission expires March 30, 1962)

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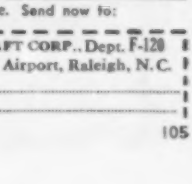

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BRIEFINGS...

(Continued from page 8)

this new service are recorded in Airman's Guide dated September 27, 1960.

On a fly-in to Catalina Island recently, Edwin Diedrich, his wife, son Joe and school pal Tommy McGrath, unwittingly became local celebrities. Diedrich's Cessna 182 proved to be the 2,000th private plane to land on this mountain-top airport. This

called for special greetings from airport manager Bob Sheker, and a bottle of champagne. Part of a 50-member flight of The Flying Country Club, a group of southern California business and professional people, the Diedrichs, of Oxnard, also are members of the Flying Farmers Assn.

Five sections of an ICAO-prepared airport manual, designed as a guide to improved airport ground facilities and aids for civil aviation, are available upon request to the organization's Montreal headquarters. The subjects covered: aircraft characteristics as they effect airport layout and design; airport obstruction surveys for preparation of obstruction charts; pavement strength; rescue and fire-fighting services; and helicopter design.

Applicants for flight instructor certificates no longer need wait one year after receiving a limited certificate before becoming eligible to receive a full rating. The FAA now rules that the experience gained in training five successful candidates, plus other requirements, is sufficient. The new ruling amends Part 20 of the Civil Air Regulations.

Cessna expands. As part of its announced overall expansion program, Cessna Aircraft has given the go-ahead for construction of this two-story addition to its present administrative facilities in Wichita. Scheduled for completion in May, 1961, the $400,000 structure features a roof-top heliport and conference-training room with seating capacity for 80 persons.

World Wide Helicopters, Inc., subsidiary of World Wide Helicopters, Ltd., has moved from San Fernando Airport and expanded its fixed-base headquarters into a newly. opened $150,000 facility at Van Nuys Municipal Airport. The new location offers tie-downs for fixed-wing aircraft, with overhaul and maintenance service for both fixed-wing and rotorcraft.

Student pilot licenses issued during 1959 totaled 67,718, second largest number issued in the past decade. Of 896 FAA-approved flight and ground schools, 237 offer combined flight and ground instruction, 618 flight only. There were 66 approved mechanic schools.

Hyperventilation problem among pilots is being studied by the Inter-University High Altitude Laboratory under Dr. John L. Chapin, University of Colorado School of Medicine. Located at 14,200 feet on Mount Evans near Denver, and operated jointly by the University, M.I.T. and Princeton, the laboratory—a permanent scientific center—is ideally situated to study this problem, believed responsible for a number of "unexplained" military crashes. (See FLYING, Sept., page 47.)

Second Annual Fly-in, at FAA's Experimental Center at Atlantic City, N. J., October 1, was attended by 1,800 visitors. Nearly 800 arrived in 37 twin-engine and 317 single-engine aircraft of 23 different makes, from as far as St. Louis, Mo., and Perth, Ontario. Last year 232 visiting aircraft registered at NAFEC's first Fly-in.

Two fellowships for graduate work in aeronautics, made possible by Link Foundation grants to the Arnold Air Society, have been awarded Peter J. Torvik of Minneapolis, and Bryant N. Kristianson, Ogden, Utah. The awards, given to outstanding USAF ROTC students, are accompanied by $1,500 in cash. Peter Torvik is attending the University of Minnesota, Bryant Kristianson, Iowa State.

Looking forward to completion of their new two-car garage upon return from vacation, Mr. and Mrs. Charles Richardson of Harrington Park, N. J., had a surprise. Son Steve, a young man of 22 with an aviation

career in mind, had usurped one side to recover the wings of his airplane, the other for its peeled-down fuselage. Result, a "tourist" attraction—and both cars outside.

Preview of 1961 Beechcraft, Hiller commercial helicopters, and a comprehensive display of new aviation parts and accessories will he held December 2-4 at Palm Desert Airpark, Palm Springs, Calif. Sponsors of the annual show are The Norman Larson Co., and the Southland Beechcraft dealers.

Complete home-study course in flying fundamentals is contained on four long-playing records marketed by the E.R.G. Corp., Box 8216, Long Beach, Calif. Prepared by 10 airline pilots, instructions are recorded in simple language for beginners. Albums are $6.95 each, or $22 for the set. A free brochure is available.

Milady's spike heels are making it necessary to refloor the Boeing 707s. According to company engineers, each quarter-inch heel of a 110-pound lady develops an impact in excess of 2,240 pounds per square inch steady-load pressure on the aluminum honeycomb floor panels. A newly developed floor paneling of corrugated aluminum sheets is replacing the honeycomb panels.

New industrial site. Taking shape around modern Bucks County Airport at Doylestown, Pa., is the Skyron Aero Industrial Park, a 124-acre industrial community where built-to-order plants are offered for sale or lease on sites ranging from two acres upward. Initial units are scheduled for December-1 completion. Although designed to attract business firms which operate their own aircraft, airport operations also provide 24-hour charter service and leasing program for firms who do not own aircraft. President of Skyron, Inc. is Marc E. Chaft.

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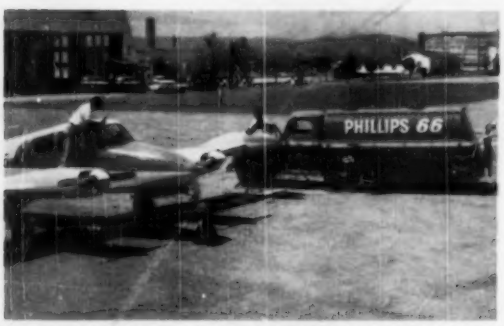


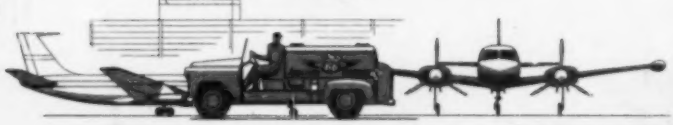
Pueblo's "airline-type" service with Phillips 66 mobile refuelers is prompt, courteous, and thorough.

Modern Terminal building features spacious restaurant with view of field traffic and the Rocky Mountains.

Pueblo, known as "the Industrial Capital of the Rocky Mountains," is justifiably proud of its well-run Memorial Airport. Served by a total of ten daily flights (Continental, Frontier, and Central Airlines) . . . this municipal field is also popular with non-skeds, business and private fliers. It's well equipped with three lighted runways over 8,300 feet long, high intensity lights, ILS, 24-hour combined station/tower (local and area approach), Omni, LF range, an FAA radar-weather station, and crash-fire-rescue equipment manned around-the-clock.

At Pueblo, 24-hour refueling with dependable Phillips *66* Aviation Gasoline (grades 80-, 91-, 100-, and 115-octane) is fast and efficient. In the terminal, you will find an excellent restaurant, car rentals, charter service, lounge, and friendly people. For overnighters there are tie-downs or hangars large enough for DC-3's . . . and excellent motels nearby. General aviation pays no landing fees.

PHILLIPS 66



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